COTTON

DECEMBER, 1911

THE ROBERT BISHOP MFG. CO.

Boston *New York* *Pittsburg*

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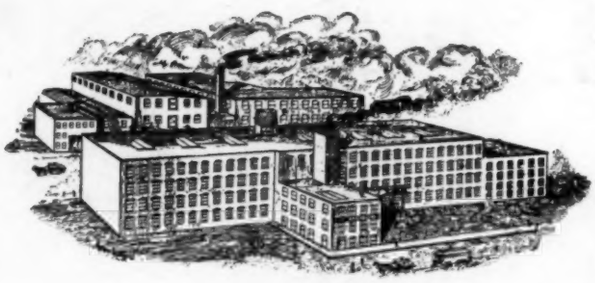

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CONTENTS.

Editorial—

Southern Ports and the Canal 45
Future Prospects Look Bright 46

General—

Southern Textile Association 47
Obituary on the Late Charles D. Tuller 60
The Supremacy of Cotton 60
Furthering India's Cotton Industry 61
The Cultivation of Long Staple Cotton 63
The Industrial Engineer 64

Mill Conditions and Market Reviews—

Southern Mill Situation 65
New England Mill Situation 65
Monthly Review of the Cotton Market 67
The Knit Goods Market 68
The Yarn Market 69

Cotton Manufacturing—

The Manufacture of Cotton Quiltings 70
Cotton Mill Machinery Calculations 73
Chemistry and the Textile Industries 75
New Chemicals for Textile Yarns 75

Knitting—

Knitted Caps and Toques 76

Dyeing, Bleaching and Finishing—

The Electrolytic Method of Bleaching 78
Strength of Liquor in Electrolytic Bleaching 79
Effect of Bleaching and Mercerizing on Cotton Yarns 81
Monopole Oil 82

Practical Problems Discussed by "Cotton's" Readers 84

New Machinery and Trade Notes 89

SOUTHERN PORTS AND THE CANAL.

Practically 100 million dollars worth of domestic merchandise from the United States was transported across the Isthmuses of Panama and Tehauntepec in the fiscal year 1911 via the two railway lines connecting, in the one case, Panama on the Pacific with Colon on the Atlantic and, in the other, Salina Cruz, the Pacific terminal, and Tehuantepec with Puerto Mexico on the Atlantic.

Trans-isthmian traffic between the eastern and western coasts of the United States and between the eastern ports of our country and Pacific coast points in Central and South America has greatly increased in recent years. In 1906, when the Panama railway offered the only rail connection via the isthmus between the Atlantic and the Pacific coasts, the total traffic amounted to about 6 million dollars. In 1907, in January of which year the Tehuantepec railway became available, the total was 21 million dollars; in 1908 it was 42 million; in 1909, 62 million; in 1910, 82½ million; and in 1911, 99 million dollars, exclusive of more than three quarters of a million dollars worth of foreign merchandise.

The value of the westward bound merchandise passing from the Atlantic coast ports across the isthmuses aggregated 62½ million dollars. These westbound shipments left the Atlantic seaboard at New York and Philadelphia, the latter's share being less than one million dollars in value and that of New York, 61½ million dollars.

There is little doubt that a large percentage of these westward shipments consisted of products of the Southern states and as such should be shipped from Southern ports instead of being railroaded 1000 to 1500 miles in the wrong direction, simply to accommodate some steamship company who declines to make of these Southern seaports a port of call.

It is to be hoped that with the opening of the Panama Canal, definite arrangements will be made for some Atlantic and Pacific line of steamers to include these principal Southern ports, at least as ports of call. New Orleans is the only Southern port which has weekly steamer connection with the isthmus and this line is to Colon only, while about 75 percent of the shipments for 1911 in both directions were handled from Puerto Mexico, with steamship connections to and from New York only.

Hawaiian sugar supplies more than half of the eastbound traffic to cities on the Atlantic and Gulf coasts of the United States. The total eastward movement last year represented 37 million dollars, of which 18 million was sugar shipped direct from Hawaii via Tehuantepec to Delaware Breakwater for orders. In addition to this, 16 million dollars worth of miscellaneous merchandise moved from San Francisco to the Atlantic and Gulf coast cities, chiefly New York, Boston, Philadelphia, and New Orleans, 9½ million dollars worth being via Panama and 6½ million via Tehuantepec. Eastward shipments from Puget Sound via the isthmuses totaled 1½ million dollars, destined mostly for New York and Charleston.

Attention has been called to these salient facts many, many times before, but as the canal approaches completion, it behooves all Southern merchants, manufacturers and bankers to get together and devise the necessary ways and means to make of these ports the natural gateways for Southern commerce. Are you willing to do your part?

FUTURE PROSPECTS LOOK BRIGHT.

A tour of all the textile zones in New England, New York, and New Jersey shows that the degree of occupation is larger than is represented by certain agencies which provide many daily newspapers with alleged industrial matter for the sole purpose of utilizing the matter for speculative stock market purposes. The explanation is that nearly all the cotton bulls of last year are cotton bears to-day.

In new construction work, extensive repairing and improvements of plants and in the installation of new machinery, the amount of work under contract for the account of the textile mills of New England, New York, and New Jersey is conservatively estimated at $89,000,000. At the offices of the principal millwrights, plans are being made for new construction and improvements, to be begun next year, that aggregate $65,000,000. The chief railroad and water freight agents in these textile areas say that their carriage of products for manufacture and of finished products in the textile trades is increasing in volume and bids fair to be enormous to the end of the year.

A director of the Amoskeag Manufacturing Company, when asked to oblige COTTON with his views of the general basic conditions of trade which warrant sound optimism, said, "We can tell by the marked increase in sales in the Western and Southern states that distributors are absolutely certain that a great trade boom is shaping forth. The reason why is not far to seek. For instance, the crops of this year will be worth at least 9½ billion dollars at the points of origin; the mineral output will be not under 2½ billion dollars; manufactures will come to at least 16 billion dollars; other industries will amount to 4 billion dollars for the current year. The net profits from all these industries for this year will be not less than 6 billion dollars, or the equivalent of 87 per cent of all the money of all kinds possessed by all our people.

"These tremendous physical facts stagger the imagination, but they are true and vital factors upon which to predicate the belief that during 1912 and 1913 we shall see a trade boom that will rise very much higher than the great boom of 1905 and 1906. As for the textile industries, they are conditioned for a great forward movement ere long. This is set forth by the stock market quotations for all sound stocks. The statistical position of these industries so far as the science of economics is concerned, was never better."

Stocks of all kinds of textiles are small at mills and in distributing hands. Under the new ideas that have come into being since the conversion of hundreds of distributing firms into corporations, stocks of goods in the principal jobbing cities have been kept down to small figures. This is notably instanced in New York, Boston, Philadelphia, Chicago, and St. Louis, where the warehouse space occupied by distributors of textile products is much less than it was ten years ago. Through consolidations, absorptions, and the reaching out for the control of great department stores, one of the oldest dry and fancy goods corporations in New York City has quadrupled its capital and increased its annual sales six fold within 15 years, but the total area of its New York warehouse space for distributing goods to retailers is no larger than it was thirty years ago. The reason is that the concern has acquired the controlling number of shares in scores of mills and factories and is shipping therefrom directly to its customers, whereas, years ago, most of what this concern sold was first brought to New York and then distributed to all markets.

Exports of textile goods to the Philippines are now moving at eight times the annual volume recorded in 1908. Our trade for textiles in South America is broadening under a recently perfected system of direct representation in all the republics by men properly trained here for that purpose and all of whom are natives of the countries in which they are now soliciting business.

Most trade authorities agree in saying that this year's exports of dyed, colored, and printed goods will far exceed the export value of the exports in unbleached cottons. These leading men in dry goods also say that exports in cotton knit goods are greatly increasing in volume. In New York and New Jersey makers of lace and embroidery are so busy that a number of plants are working with double shifts. Domestic production of these goods is fast displacing certain grades that until recently were almost altogether imported. This year's domestic production of edgings, insertions, flounces and similar goods will be far in excess of the previous year's production, providing the tariff protection on these goods is retained or increased.

Another straw indicating the trend of opinion toward the side of optimism is the recent announcement posted by M. C. D. Borden, president of the Fall River Iron Works Mills. Mr. Borden said, "Because of persistent rumors that have come to my knowledge of our intention to shut down our mills again, I have to say to our employes and others interested that we have no intention of closing the mills again at present, or until forced to do so by circumstances which I do not think will arise. It is my intention that these mills shall run from now on and indefinitely."

The fact that Mr. Borden is rated as one of the shrewdest judges of conditions in the cotton goods market, causes his announcement to be accepted as indicating anticipations on his part of an improvement in conditions in the near future that will warrant continuous running.

In speaking of the entertainment features of the Southern Textile Association convention, the editor of *Mill News* says: "We hope they will not be allowed to overshadow the original purpose of the organization—which would thus be weakened in its influence in 'the upbuilding of the South's greatest industry.' Another danger in the carrying of this entertainment feature too far, is that only the large cities will feel justified in asking the association to accept their hospitality while the smaller towns which are good manufacturing centers and ought to have the benefit of the meetings will be afraid to undertake the task it would impose upon them.

"With due appreciation of the bountiful favors which Atlanta will bestow upon the members it is to be hoped that this question of entertainment will not be allowed to have too much influence in the selection of places for holding subsequent meetings, or if necessary let the association increase the membership fees sufficient to provide an entertainmnt fund rather than to make it a burden upon the places selected."

SOUTHERN TEXTILE ASSOCIATION.

Ninth Semi-Annual Convention—Held at the Kimball House, Atlanta—Next Meeting to be Held in Greensboro, North Carolina in July.

Atlanta, the "Gate City" to the South, and renowned throughout the country as a popular convention city, once more demonstrated in its entertainment of the Southern Textile Association on Saturday December 2nd, that this reputation was well deserved.

That the several hundred delegates in attendance at this, the semi-annual convention of the Association, had become thoroughly imbued with the Atlanta spirit was evident from the enthusiasm manifested.

The delegates began to arrive on Friday morning and G. S. Escott, the genial secretary of the Association, established his headquarters in the large ballroom of the Kimball House early Friday evening and began the registration of members and the issuing of badges. Many new members were enrolled and the secretary had a very busy time during the evening and on Saturday morning until the first session convened.

MORNING SESSION.

At 11:15 A. M. the morning session was called to order by C. S. McMahan, secretary and treasurer of Cotton Publishing Co., and chairman of the entertainment committee. Mr. McMahan congratulated the association on the large attendance and on the good work being accomplished. He then introduced Frederick J. Paxon, president of the Atlanta Chamber of Commerce, who delivered a brief address of welcome in behalf of the city of Atlanta.

Mr. Paxon reminded the members of the time when Atlanta, in common with other cities, desired to secure conventions because of the publicity and consequent advertising it gave to the city. This he said, was now changed, as Atlanta had learned that the real value of conventions, was not so much the result of publicity, as from the many ideas and thoughts advanced by the visitors. Atlanta assimilated many of these ideas and afterward adapted them to suit her own conditions, and was thereby daily becoming a greater city in consequence.

The response to the address of welcome was delivered by A. B. Carter, of Athens, Ga., who besides being an active member of and worker for the Association, is also the popular Southern representative of the Victor Shaw-Ring Traveler Company. Mr Carter's response follows:

Mr. President, and gentlemen of the Southern Textile Association:

In behalf of the Association. I desire to express our appreciation for the very graceful and cordial welcome tendered by the gentleman who has preceded me.

I desire to congratulate the Association for having selected Atlanta, your beautiful city, for this, their second meeting in Georgia. Atlanta, renowned for the chivalry of her men, the beauty of her women, the classic culture of her citizens, and her wealth of historic name.

This beautiful city of Atlanta, whose history is that of progress and development; with its live, wide-awake, energetic and intelligent business men; its spirited citizenship; and its magnificent hotel facilities; has always been noted for its open hearted and delightful hospitality, and those who enter its gates are made to feel at once the sincerity of its welcome.

There is no place within my knowledge where the evidences of advancement along all lines, and especially in its financial, commercial, industrial and manufacturing enterprises are more marked and manifested than here. And we shall be very fortunate while here, if in all our getting we catch the Atlanta spirit which is characterized by success in every forward and progressive movement.

We gather here to-day from all parts of the South; from our separate fields of labor; to take counsel of each other; to read the richest pages of each other's experience; to feel the electric touch of elbows; to broaden our experience; and to learn more of our work.

A. B. CARTER.

We are on holy ground. The home of Alexander Stephens, the idol of the country; Robert Toombs, the intellectual giant of the old South; Old Ben Hill, the grand incarnation of mind and magnetism; Gordon, the thunderbolt of war and the angel of peace; Grady, whose genius blazed but for a moment like a brilliant star and then disappeared forever ere he reached the full meridian of his glory; and Eli Whitney, who gave us the cotton gin, which has moved the position of cotton from a mere domestic commodity to that of the first crop of the world. Well has it been called the King of crops, the barometer of our entire financial system. It is this that has made the South the garden spot of the world.

Gentlemen: Our work when rightly viewed should never grow monotonous. The wheels that turn the eight hundred and fifty mills of the South are the wheels of progress. Stop them and every commercial and financial interest of the South suffers. The song of prosperity is heard in the

clanking of their machinery, and when they are hushed the wail of adversity is heard in every hamlet and village of the South. The sweetest music that is heard to-day is produced by the eleven million spindles that are playing the march to which civilization is keeping step from the farmer to the financial king. The best poetry of the age is heard in the hum of the spindle and the click of the loom.

Again I thank you for our welcome to your city.

The next feature on the program was the address of the president of the Association, M. G. Stone of Spartanburg, S. C. Mr. Stone said in part:

"I greet you most cordially and assure you it is a great pleasure to be with you again. To those who attended other meetings that I have had the pleasure of being with I am glad to see you again. To those who have never before attended I am specially glad to see you and to welcome you and trust you will become active members

PRESIDENT M. G. STONE.

of our Association. I congratulate the members upon the progress that has been made both in interest taken and great increase in membership since our organization only a few short years ago.

"We should and do feel under great obligations to the men who first conceived the plan of the Association and then so faithfully worked to develop it. They were the worthy pioneers and as such should be honored. We want it known that men like David Clark, G. S. Escott, E. E. Bowen and others that had the courage of their convictions and succeeded in the founding of such an association should be honored by being publicly thanked for the work they have done for this Association. I will suggest that we show our appreciation by all rising.

"Briefly stating the objects of our Association I will quote from our Constitution as follows:

"The objects of the organization are to bring men in charge of the operations of mills into closer relationship with each other and their employers and employees and to advance their knowledge in the manufacture of textiles and the more economic operation of the mills. We aim to do this by the holding of conventions at frequent intervals for the purpose of mixing and mingling with each other, socially, making new acquaintances and renewing old ones, exchanging experiences and theories both publicly and privately and for the consideration of any subject of importance to our chosen industry. We are not in any sense a labor union and have absolutely no selfish ends to gain.

"The foregoing is an important part of the Constitution. It seems to me that it is worthy of our best efforts to see that the objects and purposes of the organization as expressed in the quotation are faithfully and zealously carried out by our members. We should, as we have opportunity, work for the best interests of the Association and in doing so we will find that we are working for the interests of ourselves and everyone connected with the industry we represent here today.

"I want to make a few remarks about our opportunities as cotton mill workers. The question is do we take advantage of our chances, or opportunities, as they present themselves from day to day or do we neglect them? Everyone has and will continue to have good opportunities to improve his conditions but the question, does the average man who occupies a position of trust and responsibility in the mill so look after his own and his employer's interest, that when the time comes he will be prepared to accept a better position, or will he neglect to fit himself for it and lose perhaps the opportunity of a lifetime? I hope not the latter for it is not pleasant to think of men losing their good opportunities.

"As individuals we are all more or less concerned about our success or failure in our chosen work. Great stress is sometimes made as to whether or not we have the needed opportunities and whether we have taken advantage of them. How often we hear it said of some one "he has the opportunity of his life and it all depends on himself whether he succeeds or not," and again we say "he missed the chance or opportunity of his life." I am inclined to think that many men are more or less fatalists and are inclined to say they once had an opportunity, but did not take advantage of it and never expected it to come again. Then, again, we often hear men say, I never had the chance or opportunity that some men have had and never expect to have. These men are fatalists or pessimists. Let me quote a familiar saying about opportunity, "Opportunity knocks but once at our door and if we are out or neglect to answer the call it does not come again." Now if that saying was absolutely true it would be a sad and discouraging thought to men who had lost or thought they had lost the opportunity of their lives.

"I will say however, that I do not now and never did believe the truth of this saying for I fully believe that the chances and opportunities of men's lives come more than once. In other words it seems to me that the coming or not coming of good opportunities rests largely with ourselves. I would prefer to think that opportunities to improve our condition comes to us a great many times. I do not want to encourage an idea in the young men, especially those who are before me (for we are all young men), and who are I trust, full of hope and ambition, that if they neglected what is sometimes called a good opportunity; that if they let it pass, it will never come again. It will come again and will continue to come as long as we are fully determined to use and do use all of our energy to succeed, and I will add that if

you have fixed aims and purposes and do not succeed at first, try again and never give up.

"There are so many things that go to make our work successful or otherwise it is not quite so easy to determine just the best phase to talk about in the relations between the overseers and the superintendents who are mainly responsible for the successful working of the mills. While I have many thoughts in connection with the subject, I will briefly touch upon but one. That is the subject of harmony, or harmonious action among the heads of the different departments of the mills and the superintendent. While some of the men may be better looking than others and some better educated, and some one thing and some another, this need not of necessity prevent a perfect understanding and concerted action among the men if they are possessed with the idea of doing their very best for the interest and success of the mill. Let them all work for the same object laying aside little differences of opinion, and that object cannot be anything else than to get the very best results possible consistent with the conditions under which they are working. No matter whether it be the making of cloth or the making of yarn, let them all pull together and the result will be better, than if there is a lack of harmony among them.

"Men sometimes prefer to go it alone and are satisfied with the results. To such, if there are any here, I will suggest that you get in line with the other fellows and like the football team make the "rush" all together. I can only urge upon you this idea of working in harmony and striving to make your work a success. While the harmony idea prevails in one mill why not take a little broader view of it and see if good results will not come if we try to work in harmony among the different mills. I trust that harmony will be the keynote of this convention and that it will be so pleasant and satisfactory, that we will feel encouraged and repaid for coming here and want to meet again."

The first technical paper of the day was read by Henry W. Atkinson, textile engineer for the Southern Manufacturing Co., of Athens, Ga., and was entitled " An Analysis of the Power Required for Plain Weaving." The paper follows:

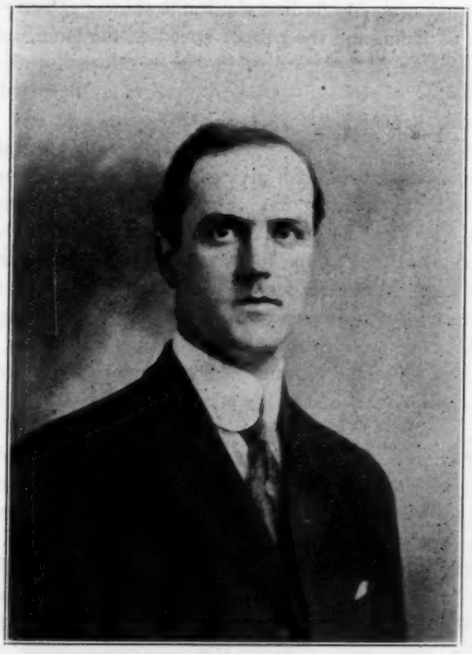
In order to make the calculation for the horse power required for a plain loom, it is necessary that four factors be known at the outset. They are the speed of the loom expressed in picks per minute, the distance the shuttle travels for every pick, the weight of the shuttle and bobbin, and the type of harness cam used. These factors are usually known or easily ascertained in connection with any particular loom under consideration.

An examination of a plain loom makes it very apparent that there are three separate motions during weaving that require power, namely: the picking motion, the shedding motion, and the slay, which includes the take-up. The amount of power required by each must be a distinct calculation, and the three results combined to give the total horse power necessary for the loom during its operation. Neglecting the friction of the bearings, gears, etc., the three motions therefore consume all the power expended in weaving.

In figuring the horse power for the picking operation, it is assumed that the shuttle travels in a straight line while crossing the loom, because its path is so nearly a straight line that the difference would not change the result we are seeking. It is also assumed that the shuttle enters the boxes properly, and that the harnesses are set so the friction of the yarn is negligible, and that there is no lost motion.

Let us now take up a concrete example, and figure the horse power required for a plain loom making 36 inch, 60 x 56 4.00 yard goods, running at 160 picks a minute, and using 120 degree crank rest harness cams, which expressed fractionally means that during ⅓ of a revolution of the crank shaft, the harnesses are stationary to allow the shuttle to pass through the warp, the other 2/3 of the revolution being used in changing the positions of the harnesses. The travel of the shuttle for every pick will be 60.25 inches. The total weight of the shuttle and bobbin is 14 ounces.

The time in which the shuttle must cross the loom is found from the speed of the loom (160 picks per minute) and the development of the harness cam, (120 degree crank rest). Since ⅓ of a revolution of the crank shaft is



HENRY W. ATKINSON.

allowed for the travel, the time will be ⅓ of 1/160 minute $= 1/480$ minute $= \frac{1}{8}$ second. It is now necessary to find the velocity of the shuttle expressed in feet per second, which with the known weight of the shuttle, will enable us to calculate the amount of work or foot pounds.

In the formula for acceleration $S = \frac{1}{2} f t.^2$ where S represents the space traveled, (f) the acceleration and (t) the time. Substituting the known values, we have 60.25 inches $= \frac{1}{2} f (\frac{1}{8})^2$, or $f = 7712$ inches per second, acceleration.

The formula for velocity is $V = ft$, where V represents velocity, (f) the acceleration, and (t) the time. Substituting the known values, we have $V = 7712$ inches $\times \frac{1}{8} = 964$ inches per second, velocity of the shuttle. 964 inches equal 80.3 feet.

The equation for work is, Work $= \frac{1}{2} M V^2$, where M represents mass (which equals weight divided by gravity), and V represents velocity; in this case it is the velocity of the shuttle. We know the values of the factors in the equation, which are as follows: Weight of shuttle is 14/16

pounds, gravity is 32 pounds, and the velocity as determined above is 80.3 feet. Substituting these values in the equation, we have

$$\text{Work} = \tfrac{1}{2}\frac{14/16}{32}(80.3)^2 = 88.15 \text{ foot-pounds per second,}$$

or 5,289 foot-pounds per minute. Since 1 horsepower represents 33,000 foot-pounds of work per minute, 5,289 foot-pounds will equal 5289/33000 horsepower, or .160 horsepower, required for the picking operation.

The speed of the loom is governed by the shuttle velocity in most cases, and the latter should be kept about the same, for all widths of looms. It will thus be seen that, as the shuttle velocity depends upon the space traveled by the shuttle, and the time. The narrower the loom, the higher the speed at which it can be run, and still maintain the same shuttle velocity as a wider but slower loom. Excessive loom speed means excessive shuttle velocity, and this causes undue strain and wear on the loom parts, resulting in excessive breakages. By finding a suitable shuttle velocity for one width of loom, and the proper speed of the loom, any width loom can be figured to give the same velocity, and the corresponding speed for that width, so that there will be no excessive wear.

To determine whether the picking motion on the loom under consideration was giving the required velocity to the shuttle as figured, or was expending too much power, the levers and straps were taken just as they were set, all except the position of the lug strap on the picker stick. The calculation was then made, using the above information, to determine the proper position to set the lug strap on the picker stick to give the required velocity to the shuttle. The position thus determined by calculation was compared with the position of the lug strap as it was set on the loom.

In making the calculations for the position of the lug strap on the picker stick, it is necessary to determine with what velocity the lug strap is moved in an horizontal direction by the levers and pick cam. From the development of the pick cam and the speed of the loom, we find the distance and time in which the pick ball is raised. From the lengths of the levers, we find the distance the lug strap moves in an horizontal direction; and subtracting the slack in the lug strap, it gives the distance through which it passes, being in contact with the picker stick. Then working back through the levers, we find the distance the pick ball raises after taking up the slack in the lug strap, and also the time.

From the development of the pick cam, we obtain the velocity with which the pick ball rises after taking up the slack in the lug strap. From the levers connecting the pick ball and lug strap, the velocity of the lug strap is found. Then, knowing the velocity required for the shuttle and the length of the picker stick, we can determine by proportion the theoretically correct position to set the lug strap on the picker stick to give the required velocity to the shuttle. The following lengths are given: Picker ball arm, 4½ inches; vertical arm, 8 inches; distance picker ball rises, 1¾ inches. The distance the lug strap is pulled when the pick cam acts upon the pick ball is found by proportion to be 3 1-9 inches.

The slack in the lug strap was 8/9 inches, so that 3 1/9 — 8/9 = 2 2/9 inches, the distance through which the lug strap passes, being in contact with the picker stick. Substituting 2 2/9 in the proportion, we find the pick ball rises a distance of 1¼ inches after taking up the slack in the lug strap. We find from the development of the pick cam, graphically, that the time required by the said cam to raise the pick ball is 3/10 of 1/16 of 1/80 minute, or 60/80 second. Then, substituting in the formula : $S = \frac{1}{2}$ ft.^{2}, where S is the space, f. the acceleration, and t. the time, we have

$$5/4 \text{ inches} = \tfrac{1}{2} \times f \times (60/80 \times 1/16 \times 3/10)^2$$

$$f = 2 \times 5/4 \times (80 \times 16 \times 10 \div 60 \times 3)^2$$

Substituting the values of f and t, in the formula: $V = f\,t$, we have

$$V = 2 \times 5/4 \times (80 \times 16 \times 10 \div 60 \times 3)^2 \times 60 \times 3 \div 80 \times 16 \times 10 = 177.77 \text{ inches,}$$

or 14.8 feet per second velocity.

Then, to find the velocity of the lug strap, from the pick ball and vertical levers, we have 4½ : 8 :: 14.8 : 26.3 feet per second, velocity.

Having found the required velocity of the shuttle to be 80.3 feet per second, and with the total length of the picker stick measuring 29½ inches, we have the following proportion to find the distance up on the stick the lug strap must be placed.

80.3 : 26.3 :: 29.5 : 9.6 inches, or the proper distance.

The distance measured on the loom was 9.5 inches, which practically agrees with the theoretical distance.

THE SHEDDING MOTION.

The shedding operation consists in raising and lowering the shades of the warp in order to allow the shuttle to insert the filling. The work performed in shedding depends upon the speed at which the harnesses pass through the space, the amount of this space, and the weight lifted. As the two harness cams have different lengths of throw, an average of the two will be taken in order to simplify the work. The distance from the treadle fulcrum to the center of the treadle plug was 9½ inches, and to the harness strap was 23⅛ inches. The throw of the cam was 1½ inches. Then, to find the distance through which the yarn passes in shedding, we have the proportion, 9½ : 23⅛ :: 1½ : 7.3 inches, or the distance.

The velocity with which the yarn rises is as follows: The cam shaft makes 80 R. P. M., so that 1 revolution equals 1/80 minute. Being 120 degree crank rest cams, the rise requires ⅓ of a revolution of the cam, or 1/240 minute, which equals ½ period. The whole period would be 1/120 minute or ½ second. Substituting in the formula for harmonic motion, we have

$$2\pi \div \sqrt{u} = \tfrac{1}{2} \text{ second; } u = 16\pi^2.$$

The weight starts 3.65 inches from the center of its path. Substituting the known values in the formula for velocity, $V = \sqrt{u\,a^2}$, where (a), is the distance, we have $\sqrt{16\pi^2} \times (3.65)^2 = 45.87$ inches or 3.82 feet per second. The weight to be lifted through the space depends on the number of ends in the warp and the amount of tension on the same, also the weight of the harnesses. The tension on the whole warp was obtained by means of a friction with a lever arm attached and a spring balance. The regular let-off motion was first taken off, and the friction placed on the smooth cylindrical part on the end of the warp beam. The lever was placed horizontally, and the spring balance attached to the lever and the floor. The friction on the warp was increased by means of a bolt, until the correct amount of tension was obtained, which was indicated by the feel and appearance of the cloth. The spring balance was run out on the lever until it kept the beam about horizontal. The arm was jerky, due to beating up, and the highest and lowest points were read on the balance and

an average taken, which was found to be 7.5 pounds. Taking the diameter of the warp beam and the distance of the spring balance on the lever, the tension on the entire warp was found to be 28.57 pounds. The harnesses weighed 5.63 pounds, so the total number of pounds to be raised was 34.2 pounds.

Substituting the known values in the formula, Work = $\frac{1}{2}MV^2$, we find the amount of work required for shedding is 7.44 foot-pounds per second, or 4464 foot-pounds per minute. This divided by 33,000 gives .0135 horse power required for shedding.

The shape of the harness cam to be used in shedding is very important. The strain on the warp during weaving is directly proportional to the distance passed through, and directly to the square of the velocity, so by having less time for rest and more for grade, the strain on the yarn is reduced, and permits a higher speed of the loom. The usual custom is to use 90 degree crank rest cams for narrow looms, 120 degree crank rest for medium widths, and 180 degree crank rest cams for broad looms.

THE SLAY.

The power required by the slay depends on the weight of the slay and the speed at which it travels. The weight in this case was estimated at 40 pounds. The velocity was figured from the number of picks per second and the length of stroke, which was 5½ inches. The travel of the slay for every pick was $2 \times 5\frac{1}{2}$ inches, or 11 inches. 160 picks per minute equals $2\frac{2}{3}$ picks per second, so that the total travel of the slay was $11 \times 2\frac{2}{3} = 29.26$ inches, or 2.44 feet per second, velocity.

Work = $\frac{1}{2}MV^2$. Substituting the values, we have 3.7 foot-pounds per second, or 222 foot-pounds per minute. This divided by 33,000 gives .0067 horse power required for the slay.

Summing up the horse power for the three operations, we have .1600 H. P. for picking, which is 88.8 per cent of the total power required; .0135 H. P. for shedding, which is 7.5 per cent of the total power required; .0067 H. P. for the slay, which is 3.7 per cent of the total power required; and these added together = .1802 H. P., which is the total for the loom.

The take-up motion was not made the subject of a separate calculation, as the arm is on the slay sword, and the small amount of power required is taken care of by the slay.

The number of looms per horse power is found by dividing .1802 into 1 horse power, which gives 5½ looms. In a similar manner, the horse power for the different operations may be calculated for any width loom, and any speed, if the dimensions can be obtained.

At the conclusion of Mr. Atkinson's paper, some telegrams and announcements were read by the Secretary, after which Chairman McMahan of the entertainment committee announced that the committee had made arragements for a theater party at the Forsyth in the evening, to be followed by supper at the Mechanical and Manufacturers Club. He also called attention to the fact that luncheon would be served at the club during the recess between the morning and afternoon sessions and that the badges worn by the delegates was all that was necessary to secure admittance for those desiring to lunch there.

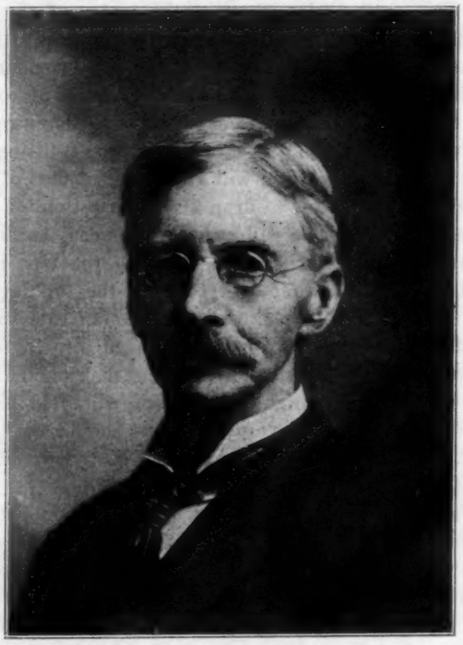
AFTERNOON SESSION.

The afternoon session was a few minutes late in starting, but was called to order by President Stone shortly after 2 o'clock. The first paper of this session was read by Superintendent D. D. Towers, of Canton, Ga., on "Waste Reduction in Cotton Manufacturing."

Mr. Towers said in part:

Reducing our waste to a minimum could be more easily accomplished if a little more care were taken in the picking, ginning and handling of the bales by the farmers. In order to keep your waste within reason you must give every detail of each process strict attention, not once a week, but every day. Even then unless your work "runs good" proper results cannot be obtained. Therefore, in order to deal with this subject we must understand thoroughly the correct principles underlying each process.

One of the most important steps along this line is to have a thoroughly balanced mixing. You should have room enough to lay down forty or fifty bales in one pile, give this a chance to thoroughly air out, then while you are using from this lot make up a second lot in a similar manner. If cotton can stand for twenty-four hours after being mixed it is all the better. Some cleaning trunk should be used between the hopper feeder and the breaker. See that all hoppers are set to carry over the same amount in a given time. Do not use any carding beaters or patent pen



G. S. ESCOTT, SECRETARY.

grids on the breaker pickers. The common Kitson grid bar used with a three blade beater and run at about nine hundred revolutions will give good results, provided you set them correctly and keep the beaters sharp and the fan draft regulated.

Where an intermediate picker is used it should be equipped with an evener motion and the laps doffed only as the machine knocks off. These laps should be weighed four times per day, and kept as near your standard as possible. In laying up to the finisher, let the apron contain two full laps at about the same time the other two are half full. A carding beater can be used with excellent results on finisher pickers. However, it should be set up very close to feed roll. When using uplands cotton, set to within 1-16 of an inch. This will give a slight combing effect before the feed rolls release, cause more motes and less fiber to be thrown out, and will also increase the strength of your yarn. See that beater blades, pen lags and mote knives

are kept sharp and smooth. Clean feed rolls and evener rolls once a month on each machine; by cleaning, I mean to take entirely out of the machine and clean the bearings thoroughly. These rolls run so slow that no matter how clogged up they may get, they will not indicate danger by getting hot, but the evener cone belts will begin to break without any apparent cause. If they do not happen to break, they will slip and cause uneven work. It is best to run kerosene oil at least once a week through all slow motion bearings on all machines; this will cut out the black gum which always forms in these parts.

It is best to have on the pickers some attachment to prevent split laps; such an arrangement is manufactured by one of the best known picker companies. It consists of a small set of fingers that are bolted to the plate right behind the top calendar roll. This is very satisfactory, but the best scheme of this kind is an arrangement, an idea of which was first given to the writer by R. D. Thomas. Remove the plate between the cages and top calendar roll, inserting in its place a piece of two-inch shaft with ends drilled to fit, in this shaft insert a series of quarter-inch steel wire springs, the curve to be on a radius of about ten inches. This spring wire is set at the center of the back side of the bar, bending across and over the bar with the ends reaching to within ¼ inch of the top celendar roll and setting just a short distance above the point of contact between the top and the second calendar roll. The pressure of these wire springs will prevent the lap from splitting, and the open space between them will allow a great deal of sand and other foreign matter to drop from the cotton.

A great deal of waste will be made between the finisher picker and the cards if care in handling the laps is not observed. Rough handling will tear up the top layer so that the card hand will have to pull off sometimes a yard or more before the lap is in condition to feed into the cards. The laps when doffed should be weighed and if found correct, racked on a suitable truck that will hold four to six laps each. Enough of these trucks should be had to store all stocks of laps. They can then be rolled right out to the cards with minimum amount of handling.

The amount of waste taken out of the cards depends of course on the product you are running. Certainly all remaining motes, neps and short fiber should here be removed. To obtain the same results from each card they must be treated separately and very probably require a different setting in order that the same result may be obtained. The backs of the cards are often neglected by the average grinder, who seems to think that if he grinds and sets his tops and cylinders and doffers his duty is done. The writer has seen screens and back plates removed whose working edges had been entirely cut away by being too close to the cylinder. Card backs and leaders should be gone over at each grinding and readjusted where necessary. A mistake often made is to set the bottom edge of a back plate further off than top edge, whereas it should be just the reverse, the bottom edge by being set up to a seventeen or twenty-two gage will aid materially in loosening up any remaining motes that the knives did not clear. Then, with the top edge off to a full gage it allows the fibers to expand and be in good condition for the flats to begin work on them.

Do not allow card hands to flap off the cards while work is being run. They are bound to throw fly and trash back into the web, and once back at this stage, there is not much chance to again remove it. Cards should be rubbed off and not flapped, so that all oil may be kept thoroughly cleaned off. If cards are kept free of oil on sides and casings they will never appear to be half so dirty. Cleanliness is certainly an equal partner to Godliness in a cotton mill. It's a certain fact that your work will run better and with less waste simply from keeping your floors clean. The mental and moral effect of a persistent effort to keep everything clean is truly remarkable in the results that can be accomplished.

Have suitable boxes around for all oily waste, sweepings and white stock. Sweepings should never have to be picked after being sent to the waste house, as no white stock at all should be swept up over the oily floor. All clean stock should be picked up immediately that it is dropped.

At the draw frames, more good stock can be ruined by neglect and lack of attention than at most any other process. Each hand should have a separate waste can and the amount of waste he makes taken up and weighed each day. Put them on their metal and get up a race to see who can run with the least amount.

Care should be taken to see that the stop motions are all kept in perfect condition. Set the rolls as close as possible for the stock being run, especially should the front and second roll be set as close as you think it ought to go and then just a shade closer. Pay special attention to the tension between the front roll and the trumpets. This should always be slack enough to absolutely prevent any stretch from creeping. Have the trumpets reamed to suit the sliver being run and set them close enough to the bite of the calendar rolls to prevent any drawing as it passes through.

This question of tension on draw frames as well as on fly frames is very important and should be regulated to suit weather conditions, in order that no stretching takes place. Scour the metallic rolls once every week, top and bottom, and go over the weights to see that they all hang free and clear. If you are unfortunate enough to have drawing frames with leather covered top rolls have them covered with leather, spirally wound on and not with cotts. When so covered in this manner buffed and varnished they will outrun three or four when covered with cotts.

After frames using leather top rolls have been run several years, the fluted steel roll becomes slick and will not always bite the fiber as it should, thereby allowing slippage, which, of course, will cause uneven work and waste. To overcome this take out your steel rolls and scour with pumice stone. This stone can be obtained in pieces as large as your fist and should be held in the hand and rubbed hard along the direction of the flutes. You will find that this will remove all glaze and the rolls will then bite the stock as good as new. After scouring with pumice stone polish with a little Spanish whiting. This method can be used for putting fly frame rolls and spinning rolls in good condition. On fly frames see that the roving traverse is making the maximum stroke, this will produce better work and save top rollers.

It should be considered a crime for any frame hand to allow singlings and doublings to go by him. Have every bobbin marked with chalk so that when these are located in the spinning room you can show them up to the hand who made them. At the fly frame your trouble with the pocket knife begins, from here on each hand, if so allowed, will keep a sharp knife with which to cut off small pieces instead of running them off. To say nothing of the waste thus made the bobbins will be ruined by constant cutting. No frame hand, spinner, doffer or spooler should be allowed

Southern Textile Association, Atlanta, Ga., Dec. 2d, 1911.

to use a knife to clean up pieces. Every particle should be run off where possible and the remainder, if any, should be pulled or slipped off. Only as a last resort should the knife be used.

Spinning frames running on filling especially should receive the closest attention at doffing times. Improper doffing will cause untold waste in the weave room. Quills should run off clean and clear in the shuttle. All broken quills should be sorted out and destroyed. Filling should be especially run, with as short a draft as possible. Use small rings and traveler heavy enough to produce a firm quill with a maximum amount of yarn thereon. In the writer's opinion it will be economy for any mill of 600 looms or over to use a winding machine for rewinding all quills of filling that are only partly filled. You all know there is an accumulation of this stuff which the weavers will not run if they can possibly avoid it. By using a winding machine you can rewind all this filling onto quills that will fit your shuttles and save every bit of it. Very often there is a tangled doff on the filling frame after the quill is over half full. By cleaning this off and rewinding, you can save nearly all of it, and really get better production with less waste from the looms with this rewound filling than when using straight from the spinning frame.

To obtain the best results, filling should always be conditioned. This may be partly accomplished by steaming, sprinkling or heating to a hot temperature. The idea of heating to a high temperature being that the wax on the fiber will soften so, that when cooled it will have set the twist. The modern way, however, is by use of a regular machine for this purpose, which from all reports gives splendid results, without damaging the quills.

Make all spinners wear a short, special made apron, with large pockets to put all their white or clean waste in. These aprons will hold enough to enable them to make their rounds without dropping any on the floor. They can then be emptied at the end of the alley in suitable boxes. With a little care in the use of these aprons the spinning room floor can be kept entirely free from clean white waste.

Look out that driving bands are not made too large. The smaller the band, consistent with proper strength, the better. Bands that are too large to fit the bottom of the whirl will cause more or less soft yarn. Hard twisted three to four hank roving is better for making bands than yarn, as when a roving band gets slack it will fall off while a yarn band usually runs many days after it is too slack, thereby making soft yarn.

Spoolers should be closely watched. It seems to be a common failing for them not to want to run a bobbin if it happens to break down near the last two or three layers. They would much prefer to lay it up and cut it off at the first opportunity. Much good, high priced thread waste will be made around the spoolers if the closest attention is not given them. Spooler hands should be made to straighten up and tie off any yarn that they tangle. With little care, a bobbin which has been tangled at the end can be tied off and every bit saved. Look out for hand knotters, which are now considered necessities. Keep them in perfect condition, as nothing short of a clean knot would prove worth tying. By all means use spools with metal shields on the head, the waste thus saved by not having any splintered spool heads will soon pay for the extra cost. Look out at the warpers that the measuring mechanism is accurate, the least tight bearing on your measuring roll will cause

trouble and waste later on. Beams should run out almost exactly together if proper care is taken at the warpers.

A great amount of waste can be, and is usually made around the slashers. A large part being caused from beams being of uneven lengths. There can be no set rule for making size by the clock, the size mixer must be able to tell from the looks and feel as to when he has it right. As weaving depends a great deal on the proper size, it is very necessary to have a thoroughly trustworthy man and one with good judgment to handle the slashers.

A mistake very often made when using a neutral or alkaline starch is that it is not cooked enough. This starch on first being boiled becomes very thick, but it is not fit for use until it has boiled thin again. This usually requires 30 to 45 minutes of hard boiling. Size, if prepared correctly, without the use of any loading material can be made to penetrate average warp yarns to about the extent of 14 per cent. Any amount more than this is usually on the surface. In passing over the slasher, see that the yarn is not unduly stretched. When a beam is first started up it is necessary to slacken the tension from where it was set when the previous beam was doffed. Lack of care and attention to the slashers has caused many a weaver to lose his job.

The writer has seen slashers that were said to have been run for years without the side shaft geared up, the receiving roll being made to pull the entire load of the creel and size box, as a result all weak or tight ends were snapped and the warps on the looms showed hundreds of loose ends coming up. An arrangement is often used on the loom beam with good results, that enables the running of the warp right on up to the lease rod before having to cut out. This consists of some form of apron usually of heavy duck, secured to the barrel of the beam, fitted with eyes into which the warp can be tied at the slasher. This apron being long enough to wind around the beam and extend up to the whip-roll. It can be readily seen that three or four yards of warp could thus be saved on each beam. At the Proximity Mills someone has invented and patented an arrangement of this kind using thin steel bands fastened to the barrel of the beam with a clamp to catch the warp, these steel bands are flexible and wind right around the beam. This device is said to be very successful, a short note of it was made in the November 2d issue of *Mill News*. In the ordinary weave-room the average fixer now-a-days is no mechanic, he seems to think his duty is only to tie on warps and put on new pickers. Looms should be kept lined and levelled and the shuttles accurately boxed at all times. Only in this way will a loom make perfect cloth.

The amount of power consumed by a loom properly set up will often vary 30 per cent from that caused by a loom in poor condition. On white work the improper setting of the harness will not show as readily as it will on colored work, however, to obtain the face required on the cloth the looms should be accurately timed. Bad cloth should be shown to the weavers by sections, as each section is called, the loom fixer should also be called and be shown the cloth as well as the weaver who made it. Post a board each day, showing the amount of seconds made on each section. This will usually spur the fixers to their utmost in order to keep seconds down. A system of docking should be so graded that a weaver who makes one bad place in a cut of cloth will not suffer as much as the one making four or five bad places. Some mills have a system of docking for the entire price of the cut when they deem it necessary to dock it all. This has a tendency to make the weaver try to take off a cut as soon as possible when they have made one bad place on it, as result, the cut will be full of thick and thin places, shuttle marks and miss-picks, showing the hurry of the weaver to get it off. Where this condition exists it is due to the system and can be overcome by docking the weaver in proportion to the quality of the entire cut.

In conclusion I would like to say that I have tried to outline a few points where excess waste will be made if the proper attention is not given. Modern machinery, kept in thorough repair, and duly operated, will reduce your waste to a minimum. In order to know what you are doing all waste should be properly weighed when carried to the waste house, and an accurate record kept of same. Once each week figure the percentage against the production and keep this before you at all times. See that the overseers know and realize the amount of waste they make, and if it happens to be up one per cent, ask the reason, for it is only by keeping everlastingly at this question that we can approach satisfactory results.

Following this was an excellent paper on "The Spinning Room," by Charles M. Stoy, of Anniston, Ala. Mr. Stoy's paper follows:

Many people are of the opinion that the process of spinning starts when the roving is delivered to the ring frame, or mule, but in reality spinning has begun when the work has started through the slubber for there the cotton receives its first twist. It is true that slubbing, intermediates and fly frames are called roving frames, for such they are, yet they spin and twist and double the yarn in its minor state, thereby preparing it for the final machine, when it is drawn out and receives yarn twist in the spinning room.

In these roving spinning machines the quality of the yarn can easily be impaired, or made almost worthless by several causes which do not arise in the spinning frame. The principal one of these causes is tension, which requires constant watchfulness and attention, for the foundation of spinning is laid on these machines. It is a well kown fact that the spinning room will run well if the roving is good. Dampness is one of the principal drawbacks to the work on these machines. Therefore. I do not believe in using the humidifiers except in extreme changes, such as very warm dry, and cold dry weather. In the first case the humidifier will cool the atmosphere; and in the second, by using warm water through them, it will do away with the electricity that is in the air, and give elasticity to the cotton. Except in cases as above described, I prefer to have them shut off in the card room as a sliver or strand of roving, filled with moisture will, in all cases, drag back and give out more resistance than a dry one. Consequently, there are more chances for strained or stretched roving, as the strain, in most cases, arises when the roving is passing through the flyer and around the presser.

Therefore, oftentimes when the fly frame appears to be running well it is making strained work. Of course, there are other things that will cause uneven roving besides the amount of moisture in a room. If the let off motion becomes choked, or does not have on the proper tension gear, thereby decreasing the speed of the bobbins in proportion to each additional layer of roving that is put on them, the same result of strained work will arise, only to a greater extent. It is very essential and important that

the tension on each one of these preparatory spinning frames should receive careful attention. The variation in numbers is from several causes. Among the most common are the following: damp stock; cotton not properly put in mixing room according to grade and length of staple; stock not properly opened up and mixed in opening room; using compressed cotton along with uncompressed cotton; getting too much waste in the lap; allowing laps to run out on finisher, or lapping joints when laps are put on apron; laps that are too heavy, or too light, allowed to go to the cards; split laps; single on drawing or roving frames; also, strained work caused by the frames not having the proper tension.

If the stock is damp when fed into the opener, and the lap is run at the regular standard weight, a part of it is moisture; and if the atmosphere is dry, as the work passes forward it will dry out and be light. If the atmosphere is damp it will retain the moisture, and when it comes to the roving frames it will be strained and stretched almost in spite of all one can do. It is then turned over to the spinner in a doubly damaged condition. It is uneven, and light. If you are using double roving, you may be able to make a poor quality of yarn out of it. If on single roving, it will be worse, for double roving is the only way to even up the strained places in the roving.

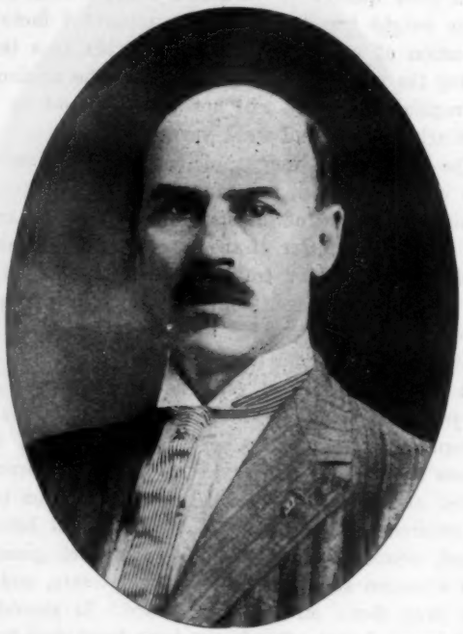
At the present time there are two forms of spinning machines in extensive use, viz., the ring frame and the mule. The mule is more commonly used in spinning hosiery yarns or filling and for very fine yarns. There are no travelers used to chafe and strain the yarn, the mule being so arranged that the carriage carrying the spindles spins as it goes out and winds what it has spun on to its spindles as it returns to the roller beam. The roving is drawn through rolls as is done on the ring spinning frame, and the principle of draft and rollers is the same in both machines. The mule is very complicated, and requires much more floor space and power and a higher paid and more skilled class of operatives to operate same than the ring frame.

Consequently, the advantages with the ring frame are as follows: More spindles in a given area; cheaper help; and increased production per spindle up to about No. 150 yarns. As regards the increase per spindle of the ring frame, it is greater in producing the coarse yarns, but if the comparison is carried to very fine yarns, the advantage in production per spindle will be in favor of the mule. The point where the mule will take the lead in production over the ring frame is about No. 150 yarn.

The amount of twist in the yarn is an important factor in the relative production of the two machines. On account of its being possible to spin and wind yarn on a mule with less tension than on a ring frame, there is an advantage in using the mule for soft twisted yarns even of coarser numbers. Owing to the previously mentioned advantages of the ring frames, mills on the coarser numbers use them, as the cost of labor is nearly always in its favor, there being only occasional conditions when the mule could be said to lead. In its action, the ring frame is the simplest machine used in the manufacture of cotton yarns, and to obtain the best results it is necessary to have the rolls and spindles correctly set and in good condition. Spinners do not complain about roving having too much twist in it, as long as it will draw well. If the rolls are properly set, even if the roving has a little too much twist, it will draw out smooth and even.

The proper distance from center to center of rolls depends upon four conditions, viz., the weight of the roving; the amount of twist; the draft; and the length of staple. As a general rule, it is customary to have the centers of steel rolls set ⅛ inch farther apart than the length of the fiber. If the roving be heavy it requires a greater distance. If very light roving, a shorter distance. Excessive twist requires a greater distance than a soft twist. A short draft requires a greater distance from center to center of rolls, than does a long draft. So, from this, it is shown that in order to get the best results, the weight, twist, draft, and length of staple must all be considered.

In setting solid top rolls, I think it best to have the front roll set so that its center will come slightly forward of the center of the front steel roll, just enough to overcome the back pull of the stock being worked and so that the top roll will not rock back and forth in cap bar bearings thereby causing lumpy yarn. By setting just enough



CHARLES M. STOY.

forward of the center to offset this back pull, the full benefit of the cushion of the roll and the weight on same is obtained, giving a better bite to the steel roll on the stock. If set too far forward of the center, a certain amount of weight is taken off of the stock which is passing between the two rolls, caused by two forces, namely: the forward movement of the roll; and the pressure of the weight, which in time, will wear a recess or notch in the nib where the end of the top roll bears against it, which will then hold the roll tight in its socket and deprive the stock which is being drawn of a part of the benefit of the weight and cushion of the roll, thereby making uneven yarn.

I have just taken out every nib on a section of frames which have been run in this way, and replaced them with new ones and found that my work was wonderfully improved by the change. One should use a good heavy oil on top rolls. I prefer a 00 non-fluid oil or grease as it does not take but a drop to the bearing each day, and stays on, thereby giving a lasting lubricant.

Care should be taken that thread guides are kept properly set. Spindles should be plumbed to rings at bottom and top of traverse. Whenever it is necessary to replace a broken spindle base or bolster, have the section man plumb the spindle true to its proper running position before he leaves it. Keep ring rails level and rings down level in same, otherwise there will be an uneven tension on the yarn, causing the traveler to have more friction on one side of the ring than the other, which will shorten the life of both traveler and ring. Have spindles oiled every two weeks with a good spindle oil.

Care should be used in the making of bands so that each band will be the same size and have the same amount of twist. It is preferable to use good roving bands, as they will not stretch and make near so much soft yarn as the yarn band, for the reason that roving bands will fall off of the whirl when they become slack or worn. The roving traverses should be set so that as near the whole base of the top roll will be traversed by the roving as possible, thereby avoiding an uneven surface on the top roll, a poor quality of yarn and a short lifed roll. The proper weight traveler is a very important factor in the production of good yarn, and also serves as a tension in winding the yarn on the bobbin. Unless the tension is good and regular the twist will not be even, and as a result irregularly twisted and weak yarn will be spun.

The number or weight of travelers is dependent on seven conditions, viz., number of yarn being spun; speed of spindles; quality of the staple of cotton; the amount of twist wanted; diameter of the ring; round or square point traveler; and whether travelers be round or flat topped. Any one of these seven conditions altered will affect the proper weight of traveler needed. Therefore, one can readily see that in order to get the right number of travelers for a certain number of yarn, he will have to make tests and judge for himself which gives the best results.

Separators should be kept level and well balanced. Frames should be leveled once a year and thoroughly inspected and overhauled. Steel rolls should be taken out and scoured once every six months, and all bearings examined, cleaned, and lubricated with a thick grease. Constant attention should be given weight levers, and see that none drop down on the lever board. It should also be borne in mind that after levers have been used for several years they will wear a notch where they hook into the lever screw, which should be filed away as it retards its action.

It is always best to have medium drafts, as excessive drafts make weak and uneven yarn. Lifting rods should be kept clean and free from chokes. I find it a good idea to wash them off occasionally with gasoline or kerosene and use no lubricating oil on them, as they get enough oil from the fly of the spindles. Builders and take-up motions should be examined frequently in order that they may remain properly set, so they will give good results, otherwise a poorly built bobbin and tangle work will result, as this is one of the vital points in the production of the ring frame. Tangle yarn is not a production of yarn, but production of waste, as it costs just as much to make waste as yarn. It is a costly policy to have a poor oiler and bander on the job as the company will be the loser by many times his wages.

Spinners should be taught to keep rolls clean and frames in a tidy condition, and impressed with the fact that good work and smooth piecing of ends must be had. Doffers should doff frames as quickly as possible and break as few ends down in doffing as is practicable. The spinning room should have the best humidifier system that can be obtained so that the atmosphere can be kept as near a standard degree of humidity and temperature as can be had, thereby imparting strength and elasticity to the yarn. Overseers, second hands, and section men should treat the help in a kind, dignified way, avoiding partiality, familiarity, and abusive language. They should use eternal vigilance, and keep hustling. Always remembering, that it is the little things that get production in the spinning room.

Secretary Escott then read invitations he had received from the officials of the city of Nashville, Tenn., and Greensboro, N. C., asking that the next annual convention be held in their respective cities.

It was voted unanimously to hold the next meeting in Greensboro, N. C., and the following committee of arrangements were appointed: R. G. Campbell, chairman; James Bangle, R. H. Armfield, W. A. Black and George P. Stone.

A motion was also made and carried to appoint Miss M. G. Cranford, of Charlotte, N. C., as the official stenographer of the Association at a certain specified sum for each meeting, and with all expenses of attending to be paid by the Association. Miss Cranford admitted her willingness to go to China, if necessary, to report a convention, but resolutely declined to make a speech, although some notable examples in oratory had been set for her in the making and seconding of the original motion.

Superintendent Walter L. Lowry, of Monroe, N. C., then read a paper entitled "The Little Things in a Mill." Mr. Lowry said in part:

I believe that for the most part the care of the machinery is good, and any competent superintendent or overseer will see that the little things on the machines receive the proper attention. But—do we always give the same attention to the cotton itself in its process of manufacture? Do we follow after the cleanliness of the cotton as we do of the machines? Do we look after the little wastes of the cotton and yarn as we do of the supplies and repairs?

To begin with, there has been much criticism of the manner in which our cotton comes to us in the bale, and where a piece of cloth is wanted with as few defects as possible, there is certainly a very serious objection to the bales as now received. The outside of the cotton comes to us with dirt, stencil marks, tar and rust from ties, and various other substances with which it may have come in contact at the gin, warehouse, or in shipment. These, if allowed to remain on the cotton, will show up to a more or less extent in the cloth.

We have found distinctly showing in our filling, threads dyed red, and which came, no doubt, from the red ink with which our local cotton was formerly stenciled. The off-grade cotton, which is sometimes found in the bales could also be used with the pickings from the outside of the cotton. Especially would I think this advisable, when we know that the defects on this cotton will not only hurt the quality of our goods, but will also reduce the production. In caring for the machines we sometimes injure the goods. The most notable example being in oiling. We will find that the oil allowed to run out on the inside of the beater bearings, will be found in the finished cloth as oily threads from a quarter of an inch to several inches long. As there is, all the way from the breaker to the spinning frame, a

continuous doubling and drawing out of the cotton, defects in the early processes, while they may or may not show as plainly as those made in a later process, will affect a greater number of ends in the yarn, and a far greater length on the ends so affected. We should, therefore, be the more particular to look after the little defects in the picker and card rooms. Oil from steel or leather rolls, or thrown from gears on speeders or spinning frames, will often be found in the cloth. Oil that has been dropped on the warp or filling bobbins, even when the oilers are careful in oiling the rolls and saddles, will also appear. Oilers very often get oil on the bobbins and quills by placing their oil cups or hands against the yarn when oiling spindles. Especially is this the case when the bases are set with the doffer guards on the inside to prevent the band knots being worn against them. To overcome this, I would suggest oiling where possible just after the frame has been doffed. Oil from shafts and bearings is so well known that it hardly needs to be mentioned here, but with a little more care, in many cases, there would be a big improvement along this line.

Another cause for oil and oily substances getting on the yarns or cloth in some mills is the cleaning of the machines with compressed air. So serious is this, that where quality is wanted, I do not think it advisable to use this system, and though we have this equipment throughout the mill, we never use it in the carding and spinning rooms when running, or in the weave room except for cleaning motors. For the reason that the filling is one continuous thread and the yarn from a given quill will all appear in a small section of the cloth, defects from oil or other causes are generally more noticeable in this than in the warp. Also, a thread when black or dirty can and should be taken out of the warp and be replaced with a thread from the selvage or elsewhere. Another cause for loss in quality and production is the small pieces of oily lint from slubber and speeder spindles, which gather in the ends of roving bobbins. If in doffing, the bobbins are carelessly thrown in the boxes, these pieces of dirty lint, will get on the roving and either be twisted in with it in the next process or cause the end to break down. This is very common on all card room bobbins from the slubbers to the fine frames. This lint will also accumulate in the bottom of the roving boxes, and a great deal get on the roving in this manner. This can be very materially reduced by laying the roving in the boxes, so that only the ends of the bobbins will touch, but this may to a slight extent reduce the production by taking longer to doff. It can also be greatly helped by making the sides and bottom of the roving boxes slatted, so that the dirt will fall through to the floor. If this is done the inside edges of the slats should be rounded off so as not to cut the roving. The help will often get oil and dirt on the roving, yarn or cloth by not keeping their hands clean, and they should be required to wash their hands after cleaning oily places before touching their work. All of the foregoing will damage the quality and quantity of the production, but there are more small defects caused by lint being brushed or fanned off of the machines and flying into the ends, or on the roving, than from any other cause.

Spinners will, if allowed to clean out guides with pieces of cotton waste, often allow little pieces of the waste to get twisted in the ends, either breaking them down on the frame or in the spooler or weave rooms. If any small pieces should get through into the cloth, they will injure the quality. The remedy for these things is constant care and attention, and in some instances changing the method of having the work done. For instance, using rags for cleaning spindle rails and bases in the place of whisk brooms. The pins in the end of the underclearers on the spinning frame should be closely looked after and kept free of lint and cotton. This will save gouts and broken ends. The chalk used to mark the roving will show in the yarn and for this reason chalk as light in color as is possible to get should be used.

In passing to the spooler and warper room, great care should be exercised in setting and keeping set the spooler guides, and in seeing that all the ends are run through the guides. It is much easier and cheaper to tie up ends in this room than in the weave room—perhaps after a bad place has been made in the cloth. These guides should be set to a gauge only a little larger than the diameter of the thread. Spooler-hands should be required to hold the threads after tying a knot until the slack is taken up, in

WALTER L. LOWRY.

order to prevent the yarn twisting up at the knot and causing trouble in the weave room. Neither should they be allowed to let loose strings be caught or tied in with the yarn as is often the case. If the spools are properly marked, the section-hand or warper-tender can, by running the warpers slowly a little while each day find who is responsible for the bad work. Wooden warper skewers should be discarded as soon as the ends show much wear, as the additional friction thus placed on the yarn will cause many more ends to break. The spoolers and warpers should be kept thoroughly clean, but should be cleaned only when they are stopped.

The manner in which a warp is sized will make a great difference in the appearance of the cloth, and in this we should carefully consider the use for which the goods are intended. In the weave room there are many points on which good mill men will differ very considerably, and there, as elsewhere in the mill, no fixed rules can be followed.

In the ordering of harness and reeds the eyes of the harness should be as large and as open as the character

of the weave will permit and not chafe the yarn too much, as a weaver can draw a broken thread through an open oval eye much more quickly than through a long narrow one. To permit of adjustment the reed should not be long enough to occupy the entire reed space. If the reed is a little shorter than the reed space, we can set the reed with the harness even, if they are not drawn straight, and in this manner, sometimes save the selvages a very severe strain by not having to go from the harness to the reed at an angle. The reed should not be deeper than is necessary for the shade of the cloth, for the wider the reed, the greater the tendency to remain open after a thread has been drawn through.

There has been a great deal said for and against leather on shuttle binders, and though I think that the wooden binder covered with leather is far the best, I will not insist on making a point of this. Different styles of looms will have different details, therefore what might be best on one loom may not be on another make, and for this reason everything said will not be applicable to all looms. In explanation, too, of some of the things that I am going to say, and while I want to refrain as much as possible from personal allusions, I want to say that at our mill, we make from 72 to 99 inch cloth for sheets, and from the fact that our looms are so wide, we have been able to overcome and notice some things, which, while they are more noticeable on the wider loom, will apply to the narrower loom as well. In the bearings of our vibrating whip rolls, we have riveted a little piece of leather, and have found that by putting two or three drops of oil on this leather before tying on a new warp, we keep these bearings sufficiently oiled, and at the same time prevent any oil working out on the warp.

In fixing almost any loom there will be found some small pieces that are defective and give more trouble than they should. If, after a thorough examination, this is found to be a fault of the part, and not of poor fixing or lack of attention, some plan should be devised to overcome this defect, and instead of ordering defective pieces over and over again, stronger and more durable parts should be ordered to replace the weaker ones as they give out. These may be obtained from a foundry or direct from the manufacturers. In cases like this, I think, the manufacturers will be found more than willing to listen to intelligent suggestions from practical men.

The shuttle is another thing that I believe needs attention in a number of mills. All will admit, I think, that the back of the shuttle wears most. Before I prepared this article, I requested shuttles from several mills, and I have here the shuttles which I received in response to my requests. You will note that all have the back the same thickness as the front, though as stated above, the back will wear out as a rule much more quickly. I have also a sample of the shuttle we are using on our wide looms; the back being from 1/16 to 3/32 of an inch thicker than the front. This not only gives the shuttle a chance to be planed off when for any reason the back has become worn, but also adds greatly to the strength of the shuttle, and will increase the life, as we have found, from 50 to 100 percent. Some may argue, to my mind wrongfully, that it will take more power to run this shuttle, and even granting that it does, it will amount to very little as compared to the efficiency of the shuttle. To ascertain about what is the additional weight, I have sawed out the back of one of the reinforced shuttles, and find that the entire back weighs a little less than 2½ ounces. The weight therefore of the extra thickness will hardly amount to over ¾ of an ounce, or less than the variations in an ordinary lot of shuttles of the same size.

In the manufacture of plain cotton goods, the cloth room is, as a rule, the most neglected place in the mill, and this is, in my opinion, a very serious mistake. Particular care should be taken where the cloth is to go direct to the consumer, as the outside appearance is what the merchant and lady buyer will consider mostly. In this way, a rather inferior piece of goods, well put up, has oftentimes a decided advantage over a much better cloth carelessly packed. Cloth can best be inspected on machines made for this purpose. Here many of the little defects, which in spite of all the care and attention we can give are often to be found, can be corrected. All knotty filling should be taken out, threads-out scratched up, and oil washed out.

An excellent solution for taking out this oil can be made by chipping up four pounds of ivory soap, and boiling it in eight gallons of water. To this add one to four ounces salpetre and a gallon of ammonia. Rub this solution into the cloth with the end of a hard-wood paddle until the oil disappears and then wash out with a sponge and clean water.

By using a printed report from the inspectors, the overseer or superintendent can tell at a glance how much seconds are being made and from what causes, and knowing this, they can the more readily apply the remedy. As the bad cloth is shown to the weavers, all that can be made into firsts should be laid aside to be worked over. As stated in the beginning, the looking after the little things can and will make a big improvement in the production and quality of a mill, and if, in ordering new supplies or repairs, care be taken to get the best things for the purpose intended, whether it is the same as has been in use or not, defective parts will be gradually built up and all greatly improved.

Mr. Lowry's paper was followed by an excellent paper entitled "The Story of Coal Tar," by Professor John E. Halstead. Professor Halstead handled his subject in considerable detail, and in a very interesting manner. Lack of space, however, prevents its presentation here.

The next paper on the program was entitled "Reduction of Power by Alignment," by George W. Loggie, of Boston, Mass. Because of the lateness of the hour Mr. Loggie did not read his paper, which, however, will appear in full in the official report of the meeting and be distributed to the members. He spoke extemporaneously a few minutes and outlined what his paper contained.

Mr. Loggie's paper was in part as follows:

In discussing this subject with one of your Southern mill superintendents he said, "Line shaft friction is a necessary evil, which is always with us. We try to line our shaft as near as possible and let it go at that. Perfect alignment is impossible on long lengths, and if I can keep my friction to 30 per cent I am more than delighted." This superintendent has the reputation of being up-to-date, thoroughly practical and a careful man. His is one of the very best mills in this country, and conditions in his plant were very satisfactory, as viewed from the old standard. This same superintendent recently wrote me a letter in which he said: "To say that we are pleased with your method of aligning and leveling shafting would be putting it mildly indeed.

We believe our shafting was kept in as perfect alignment as possible without the use of your outfit, but since we have started to use this tool we are convinced that every mill in this country that is not equipped with a similar device is losing power by shafting friction." This is not an unusual experience and I believe states fairly the exact facts as regards this question of line shaft friction and waste of power caused thereby.

Now what are the facts, as regards this question of power reduction by alignment. The writer visited 31 mills in the South, and in no single case did he find a mill enjoying anything like the full benefit of the power generated. In each case there was a decided loss in efficiency. Each one of these mills very kindly gave information concerning their friction load and power loss. The smallest friction load claimed in any of the mills is 29½ per cent, and this I believe to be an excellent showing under the old method of working. The highest friction load admitted was 48 8-10 per cent; on the average 37 per cent of the power generated was lost in transmission, used on the shafting and did not reach the point where the power was

DAVID CLARK, TREASURER.

intended to be used. As against this, I submit statistics secured from eleven mills, each of which has used the new and scientific method of aligning shafting. Of these eleven mills the lowest friction load was 15 per cent; the highest 23 per cent; therefore the average friction consumption in these eleven mills was 20 1-10 per cent, a difference practically of 17 per cent between the new method of doing this work and the old method used up to the present time.

There is no longer any excuse for not having shafting in perfect alignment, irrespective of the length of the line, the various sizes on the line, or the position of the shafting; by the latter I mean whether the shafting runs over the head, under the tables, in pits, or on the floors, or just under the floor, for the method to which I refer can be used on any shafting no matter how situated. Time will not permit my quoting from many individual experiences, but I should like to cite from one of a 57,000 spindle mill in North Carolina. The superintendent of the mill after making his tests, writes as follows: "We have used your system of aligning and leveling shafting with entire satisfaction. We consider it the best investment we have made in some time. In one room alone we saved 20 horsepower."

From another mill in South Carolina, the superintendent says, "We have been over 9,000 feet of shafting and from the kinks and bumps which we were able to straighten, we feel that we have been more than repaid for the investment in your tools. While we have no accurate test as to the saving in power, we know that we are operating with considerable less horsepower, as in the words of the 'oiler' it takes longer for the engines to stop."

Until recent years the friction losses of stationary engines amounted to 15 to 20 per cent of the power developed, but to such a state of mechanical refienement has modern engine construction been brought that the frictional horsepower often amounts to only 2 or 3 per cent. This device does for shafting what improved mechanics have done for the engine. It enables us to align and level with such accuracy that what was considered a fair friction load is now considered extremely excessive. The new standard calls for a friction load of not over 20 per cent.

This question of saving in shaft friction is serious and goes more deeply than the simple question of power saving, for it effects materially the efficiency of the mill, the quality and quantity of the output; for instance, the removing of this surplus friction from the shafting invariably means a much more even run.

The question of line shaft friction and how to keep our transmission in good condition is no longer that troublesome problem affecting the whole question of mill operation, for we have at last a scientific method of doing this work. I would not do justice either to you, or to the subject, were I to fail to call your attention to the larger question of shop surveying as involved in the method suggested, of which the aligning of shafting is but a part. For instance, the tool is the most practical and accurate known for lining and leveling spinning frames, roving frames, mules and mule-runs, or any and all textile equipment where the question or alignment or level is involved. This question of scientific shop surveying leads us to a more efficient plant, greatly improved mechanical conditions and better output.

The last business to be taken up before adjournment was the adoption of resolutions of thanks to President Paxon of the Atlanta Chamber of Commerce for his interesting address and hearty welcome; to the entertainment committee for their eminently successful handling of the social features of the convention; and to the General Electric Company for their services in trimming and lighting the convention hall.

Greensboro, N. C., where the next annual meeting will be held, is one of the livest cities of the Piedmont section of North Carolina. It is the home of the largest denim mill in the world. A 134,000 horsepower hydro-electric plant. Also many other features that will prove attractive to members of the Association during their visit. One of these, which will probably create especial interest, is the Guilford battle ground of Revolutionary fame, with its museum and monuments and wealth of historic lore. Every active member of the Association should make preparations during the next six months to attend this meeting as it is sure to be an interesting and instructive trip.

OBITUARY.

Charles D. Tuller, president of the Exposition Cotton Mills of Atlanta, and one of the leading cotton manufacturers in the State of Georgia, died at an early hour Saturday morning, November 11th. He had been ill for several weeks with a complicated attack of pneumonia. His death however, came as a shock to his hundreds of business and social friends throughout the city and state. Besides being president of one mill and interested in two others, he was connected with a number of mill associations and was regarded as one of the brightest and most up-to-date men in the business. He was interested in the Roswell Manufacturing Company and in the Harbersham Cotton Mills.

He was serving his second consecutive term as president of the Georgia Industrial Association; was a member of the board of governors of the American Cotton Manufacturers' Association; and on the executive committee of the Textile Manufacturers Exchange. He was also secretary and treasurer of the North Georgia Mutual Association, an organization of cotton mill men of this part of the state.

The Late Charles D. Tuller.

Mr. Tuller was the son of the late William H. Tuller, one of the pioneer citizens of Atlanta and at one time cashier of the Atlanta National Bank. He was born in LaGrange, Ga., and came to Atlanta with his father as a young boy. When twenty years of age he started with the Exposition mills when they were established. He later became secretary and treasurer, then vice-president, and on the death of Dr. Turner two years ago he was at once chosen to head the firm.

Mr. Tuller was 50 years old, and had reached the position he held as president of the Exposition Cotton Mills after 30 years of conscientious attention and close application to his work. It is a recognized fact that Mr. Tuller's personality and ability were responsible for the high standard of efficiency which is found at the Exposition Mills. Himself an able man, his genial personality attracted others of a like calibre as associates and the result is one of the most successful manufacturing plants to be found in this section. His life shows the result of grit and ambition when combined with close application and absolute hosesty of purpose.

Always earnest and sincere and a man of deep religious convictions, Mr. Tuller was one of the leading members of the North Avenue Prebysterian Church. He had been superintendent of the Sunday School and at the time of his death was an elder in the church.

Mr. Tuller cared little for the pleasures of society and devoted what time he could spare from his large business to his church and family. In his domestic life he was regarded as an ideal father, husband, and son, and was held in the highest esteem by those who came in contact with him.

Surviving Mr. Tuller, who lived at 42 West North Ave., are his wife and seven children; his mother, Mrs. William H. Tuller; and four sisters, Misses Emma and Lella Tuller of Atlanta; Mrs. George Kendell of Rochester, N. Y., and Mrs. Milton Orr of New York City.

THE SUPREMACY OF COTTON.

That cotton to-day plays a bigger part in industrial development than any other commodity except steel was pointed out recently by a man closely identified with the cotton trade, who enumerated some of the principal purposes for which cotton is employed. While in many cases his figures deal with the use of cotton in the United States, each instance has its application in other countries.

"This is the age of cotton," said the man referred above. "It is just as far in advance of the iron age as the iron age was in advance of the stone age. Cotton enters into the manufacture of more articles of commerce than any other product of the soil. Eliminate cotton and the mere stoppage of spindles and looms would be but a trifle compared with the paralysis that would visit countless other industries.

"Why has a new record for consumption been established? Where has the cotton gone?

"The world has just begun to find out the countless uses to which cotton is put. There is hardly an industry of importance to-day that does not pay tribute to King Cotton. The man who takes a trip on a train hardly realizes that the railroads of this great country are among the largest consumers of cotton. Yet cotton duck is the basis of the air brake hose; cotton duck is the basis of the enameled ceilings; the plush chairs are of cotton; the leather seats in the day coaches and smoking compartments are cotton.

"It would be difficult to estimate the amount of cotton required yearly for the harvesting and marketing of our great cereal crop. Thousands of bales annually go into the making of bags. We believe the largest individual contract for cotton goods in the world is the one placed annually by a company in the United States that manufactures agricutural implements. It calls for millions of yards of cotton duck to go into the manufacture of aprons, carriers and elevators for thousands of reapers and binders, headers and threshers, and a recent authority places the output throughout the world at 1,500,000 new machines annually, and this calls for 50,000,000 yards of cotton duck, running two or three pounds to the yard.

"Electricity is the most powerful agent in the world, but it cannot get along without cotton. Millions of miles of copper wire annually owe the perfection of their insulation to cotton yarns or tape of cotton cloth. It is estimated that the sales in the New York market alone amount to 400,000 pounds of yarn weekly to the electrical industry.

"To-day the service uniforms of the armies of the world consist of khaki cloth or something similar. The United States alone requires about 5,000,000 yards of eight-ounce khaki cloth annually. When one comes to figure out the amount of khaki required for the military establishments of Great Britain, Germany, France, Russia and other countries, the total is likely to reach staggering proportions.

"The navies of the world use a tremendous amount of khaki and other duck. It is said that more cotton is used by battleships to-day than in the days when the men-of-war were sailing vessels. While the sails have disappeared cotton duck is extensively used for awnings, coverings for launches and similar purposes.

"Another demand for cotton cloth has been created by the increasing use of cotton cloth for growing tobacco under shade. Several hundred acres of land in Connecticut are covered in this manner. One large tobacco company uses 1,000,000 yards of cloth for the shade culture in Florida and Cuba. The same company also uses 4,000,000 yards of cloth annually for making bags for two of its popular brands of smoking tobacco.

"Cotton bags have displaced barrels to a great extent in the shipment of sugar, salt and flour. With cotton at 15 cents a pound the bags would be cheaper than barrels.

"Cotton plays an important part in the mining and marketing of coal. A heavy cotton duck is extensively used in coal mines for the purpose of making ventilating chutes. About 15,000,000 yards of cotton duck annually are made into coal bags for delivering coal where a chute cannot be employed to advantage.

"There has been a great expansion in the use of tarpaulin. In the British possessions, especially in South Africa, tarpaulin has displaced the old flat duck for covers for flat cars, and for wagon covers and tents. In South Africa, also, the cotton blankets have driven out the woolen, and 4,500 bales, 200 blankets to the bale, are imported by that country annually.

"Overcoats of cotton duck with blanket lining have taken the place of heavy wool and fur garments in the American and Canadian northwest. It is estimated that 20,000,000 yards annually are consumed by this branch of the trade alone. Thousands of bales of cotton annually find their way into the construction of fireproof buildings in our large cities. Wherever the steam and hot water pipes are exposed they are covered with asbestos covering, around which is placed cotton duck.

"Cotton cloth has taken the place of wall paper in thousands of modern houses. Several million yards annually are used in making cloth signs and advertisements. Many large manufacturing concerns use enormous quantities of cloth in their decorative advertisements. Pottery establishments use millions of yards of army duck for the purpose of squeezing water out of clay.

"The Government requires 4,000,000 yards of cotton duck annually for coin bags. Cement companies use about 8,000,000 yards of cotton bagging annually. About 2,000,000 yards of cotton duck annually are made into feed bags for horses.

"Wood pulp paper mills and other paper mills use enormous quantities of heavy cotton duck for dryers. Cotton drills and duck to the extent of millions of yards are used for wagon tops, cushions, waterproof coats, 'pantasote,' etc. A heavy duck is used to the extent of millions of yards annually for the purpose of filtering oils.

"Cotton duck is the basis of rubber belting, and all kinds of rubber hose. Sales of these branches of the trade amount to 50,000,000 yards annually. Among the smaller users, but making a heavy aggregate, are tennis and gymnasium shoes; duck canopy for shower baths, where rubber formerly was used; covering of trunks and telescopes, binding of books, draining of mines—heavy duck to the extent of 4,000,000 yards annually."—*American Exporter for December.*

FURTHERING INDIA'S COTTON INDUSTRY.

BY ROBERT GRIMSHAW.

In the last few months the condition of the Indian cotton industry has been the subject of very earnest discussion, in view, among other things of the present crisis in that cotton industry, the laying of the corner stone of the immense new electrical power station in Bombay, and the passing of the new Indian factory law. The recent step taken by Duke to introduce American cotton fabrics direct into China, without the intermediation of jobbers and even perhaps of wholesale merchants, has not diminished the interest which this subject has for all concerned.

As regards the electrical power station, says the official report of the German Imperial Consulate in Bombay, this is in the first place to provide the cotton-spinning mills in Bombay and vicinity with cheap and convenient power. In the mountain chain westward of Bombay, the so-called Ghauts, there falls during the rainy season—that is, from June to October—a tremendous amount of rain, which up to the present has been allowed to flow unhindered and unused to the sea;—indeed it is not even used for irrigation. It is now proposed to dam up this water on the line running to Madras, so that a plentiful supply for all purposes may be available during the entire year.

For this purpose there will be three immense dams, of which the smallest will serve to regulate the water-supply during the monsoons, and to help out during the short pauses in the rainy months; while the other two will be filled during the rainy season and serve as supply during the long dry period between October and June. The following table gives an idea of the general dimensions of the three reservoirs to be formed by the proposed dams:

	Height above the sea, ft.	Height of dam above sole	Length of dam feet.	Area acres	Amount of water cu. ft.
Shirawta...	2158	93	8000	2847	6064
Whalwan ..	2084	68	4500	1697	2506
Lanauli....	2050	26	2700	720	378

At first there will be built only the dams at Lanauli, for monsoon regulation, and at Whalwan, for the dry season; the larger one at Shirawta being left for later construction when needed. Should the dam at Shirawta be

built, the total available power would be 50,000 horse. From the power station at Khopoli to the vicinity of Bombay, 43 miles, the electric current will be carried overhead on masts, about 450 feet apart, to a distributing station, from which underground cables will lead to the different consumers of power and light. After the water has expended its power, it is expected to be able to utilize it for the irrigation of 30,000 to 40,000 acres of lands where vegetables, fruit, etc., can be raised for the Bombay market.

The capital of the Company charged with this enterprise consists of 10,000 original and 10,000 preferred shares, each of 1,000 rupees; that is, in all 20 million rupees, of which 12 million are already paid in. Besides this, there are 5½ million rupees of bonds. The entire sum has been raised in India partly from the reigning princes. The undertaking is being financed by the Parsee firm of Tata, in Bombay, which has also built the Kalimati Steel Works, near Calcutta. The work is in the hands of an American named Gibbs, formerly chief engineer of the Government of Mysore, and of the London firm of Alfred Dickinson & Co.

As above remarked, the principal customer for current will be the Bombay cotton manufacturing establishments with their 2½ million spindles and 40,000 looms. According to a calculation of Sir George Clarke, a ton of coal costs the Lancanshire mills only 7½ shillings ($1.80) whereas the Bombay mills have to pay 20 sh. 9d. ($5.00). Electrical power in Bombay will cost only 0.55 annas (a trifle over acent), per unit; whereas the Lancaster spinner must pay two to three farthings (½ to ¾ of a cent). By the introduction of this cheap power the Bombay cotton industry will be able to compete not only with the English mills, but also with the other Indian factories—assuming that the Bombay concerns will be able to stand the first cost of installation.

A further good omen for the success of the enterprise is the new "factory law" for the protection of the operatives, which goes into effect July 1. The principal feature thereof is the fixing of the normal day's labor in textile mills at 12 hours for adult male operatives. This bill has created great excitement in interested circles, and met with great opposition from various directions. The Calcutta manufacturers, especially, endeavored up to the very last to upset the plan, and make matters more convenient for themselves. But at the last moment the Government showed firmness, and thereby rendered the cotton industry a service which, however, has not been generally appreciated. The new law will not only tend to protect and raise the working classes, but prevent undue rivalry between the various mills.

Certainly, the new law and the introduction of electrical power, will make their benefits manifest only in the future. At present, the outlook for the cotton industry is as unfavorable as possible. In the last few years the price of raw cotton has risen to an extent not paralleled since the American civil war. On the other hand, the mills have been confronted with no corresponding rise in prices in their main markets—India and China. It is true that the former country has had two good years; gold and silver have flowed into the country in plenty, and the population should therefore be in a position to pay out more money for cotton goods. But for all that, the market remains flat, and buyers are holding back in the hopes of a possible fall in prices. The conditions are similar in China where besides this the rising native cotton industry, the Japanese opposition, and the breaking out of the pest, have acted unfavorably on prices. Further, Indian exporters of cotton yarns complain that the new Indian silver duty must be borne by the yarns exported to China.

All these circumstances make the cotton crisis, which extends over the entire world, especially severely felt in India. In 1905, the total profits of the Indian cotton industry were 35 million rupees; but in 1909 only 6 millions, on a capitalization of 230 million. In 1910 and 1911 the profits were even less. At present, in Bombay alone over 20 mills are shut down, and the majority of the companies engaged in this manufacture declared no dividends for the last half of 1910.

Under these circumstances it is not to be wondered at that the movement for the abolition of the "excise duty" should be resumed. This duty, which amounts to 3½ per cent of the value of the cotton goods manufactured in the Indian mills, serves to offset the import duties of like amount, levied on the corresponding English and foreign manufactures. It brings in about four million rupees a year, or more than the Indian spinning and weaving establishments earn in these bad times. Its removal was recently the subject of earnest consideration on the part of the Indian Viceroy in Calcutta; but Mr. Clark, the new Secretary of the Indian Board of Trade, could not give those interested the slightest hope of any relief in the matter.

At present everything is dependent on the result of the next monsoon and the amount of this year's cotton harvest. If 1911 has a good monsoon, and there is a generous cotton crop, both in India and in America, the Indian cotton industry will have a cheaper raw material, and better market conditions, and be able to pull through the crisis. If, however, by reason of a bad cotton crop in all countries, the price of cotton remains as high as at present, or still worse, if it rises, and where at the same time the next monsoon brings but little rain, and thus reduces the purchasing power of Indian consumers, the condition of the Indian cotton manufacturers will be indeed earnest; and the commercial ruin of a number of Indian cotton factories will be inevitable.

Consul General Samuel S. Knabenshue, of Tientsin, China, has forwarded a copy of an advertisement issued by the managing director of the Imperial Railways of North China for the supply of 100 tons of cotton waste for the year 1912. The waste must be delivered in lots of 20 tons each every three months, beginning January 1, 1912. Hsinho, the point of delivery, is a few miles from the mouth of the Peiho river, and the railway touches the river there. Quotations should be given in local currency dollars, with samples, which are to be addressed to the managing director, Imperial Railways of North China. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file No. 7368.

One of the commercial agents of the Department of Commerce and Labor reports that a Spanish dealer in supplies for cotton mills would like to get in touch with American firms producing such articles. This house makes a specialty of bobbins, spools, and shuttles, and has expressed a desire to receive samples and prices of American supplies in this line. Correspondence should be in French or Spanish. For further information apply to the Bureau of Manufacturers, Washington, D. C., and refer to file No. 7433.

THE CULTIVATION OF LONG STAPLE COTTON.

SOME FACTS ABOUT VARIETIES, MARKETS, AND AVERAGE VALUES. EXPERIMENTS IN GROWING EGYPTIAN AND LONG STAPLE UPLAND IN THE UNITED STATES.

The cultivation of sea-island cotton in the United States at the present time, as shown by the returns of ginners, given in the recent Census Bureau report on cotton production for 1910, is confined to 43 counties, distributed as follows: Fourteen in Florida, 25 in Georgia, and 4 in South Carolina, but it is not grown in all parts of the counties from which it is returned. Attempts made in many other parts of these and other states to grow this cotton have produced such unsatisfactory results that all efforts to grow it outside of certain well-defined areas in the states named have been abandoned.

The finest sea-island cotton is grown on the islands off the coast of South Carolina by planters who have for many years paid the most careful attention to seed selection. The fiber produced is long and fine, and is harvested and handled with such care that the grower's private brand is frequently accepted by buyers as a guarantee of the quality. These fine "crop lots," all of the finest of which are exported, comprise about one-third of the sea-island cotton marketed at Charleston, and sell for from 30 to 75 cents per pound. Growers who raise sea-island cotton in the interior must secure new seed frequently from the coast region in order to preserve the identity of the fiber, which degenerates rapidly into upland fiber when grown away from the coast.

Aside from the difficulties presented by soil and climatic conditions, there are other obstacles in the way of extending this culture beyond present well-defined limits. Among these are: Lack of proper experience in cultivating, harvesting, and handling in new territory; objection to the small and partially closed sea-island bolls on the part of the pickers accustomed to the upland varieties, notwithstanding the fact that they receive $1.25 per hundred pounds for picking sea-island cotton and only 50 to 75 cents per hundred pounds for picking upland cotton; the necessity of using the roller gin for sea-island cotton, since saws injure the staple; and the disadvantage of selling sea-island cotton in a market where the buyers are unaccustomed to it.

The South Carolina crop is marketed principally at Charleston, and that of Georgia and Florida at Savannah, Blackshear, and Valdosta, Ga. There is a marked difference in the style of the sea-island cotton bale in different localities. The value of the better grades of sea-island cotton is only slightly affected by the fluctuations in the size of the crop or the price of the short-staple upland variety, but the amount and quality of the long-staple upland cotton in the market seriously affect the price of the lower grades of sea-island.

The average quantity of sea-island cotton produced each year is equivalent to about 70,000 bales, of 500 pounds each. Of this amount, an average of 25,000 bales is exported and 45,000 bales are consumed in this country.

The sea-island cotton now being grown in the West Indies is said to equal the average American product, and competes with that grown in South Carolina rather than with the inferior kinds grown in Florida and Georgia. The West Indian industry is new, having been developed largely since 1902, and is as yet of small proportions, the area devoted to its culture being estimated at 15,000 acres.

Egyptian cotton, the demand for which is increasing in this country, is to some extent a competitor of sea-island, and about 150,000 bales, valued at more than $14,000,000, are being imported annually. While its fibre is not so long and fine as that of sea-island, it is very strong, and, being prepared more carefully for market, it is freer from waste than the American fiber and more desirable for the manufacturer. There are four principal reasons for the extensive use of Egyptian cotton in this country: It is best adapted to mercerizing and other processes that give a high finish to cloth and cause it to resemble silk; its exceptional clearness, as well as its capacity for taking dyes, fits it for mixing with silk and for filling sateen, India linens, and similar goods having a brilliant surface; the brown color of the Mit Afifi grade of this fiber allows it to be used without dyeing in manufacturing such goods as balbriggan underwear and lace curtains in which the ecru shade is desired; and it can be used for the manufacture of sewing thread and other articles which need to be very strong and for which no other type of cotton but sea-island can be used.

The constantly increasing demand in this country for Egyptian cotton has led the Department of Agriculture to make experiments in the growing of this variety in the United States. Since this type of cotton will continue to produce and ripen until a hard frost occurs, the greatest yield can be obtained in regions where the autumn temperatures are highest. For this reason the experiments of the department have been carried on by means of irrigation in the hot, dry portions of Southern Arizona and Southeastern California, where the climate corresponds most closely to that of Egypt.

The methods of breeding have been simple. At first the best seeds obtainable in Egypt were used. Each year the seeds of the plants showing the best characteristics of growth and production were preserved for planting the next season. Two distinct varieties and several superior strains have been developed by the experiments of the past seven years. The varieties Yuma and Somerton, named from the localities in which grown, have been developed from imported seed of the Mit Afifi, and are as distinct in character of plant, boll, and fiber as the varieties of Abbasi and Jonnovitch, which developed in Egypt from the same source. The yuma variety has a vibrorous growth, its bolls are long and tapering, the fiber is silky and cream colored, averaging 1¾ inches in length, and the production of lint is large. The plant of the Somerton variety is more bushy than that of the Yuma, its bolls are sharply pointed, have smoother seeds, and yield less lint. Samples of the fiber produced have been submitted to the examination of spinners and other experts, who pronounce it equal to kindred varieties imported.

In recent years the demand for superior cotton staples has increased steadily, and in response better varieties of upland cotton are being produced in our cotton-growing states. Extra staple cotton can be grown in many localities, and through hybridization, seed selection, and better methods of cultivation, is being produced in greater quantities. Most of the long-staple upland cotton is grown in the Mississippi valley between Memphis, Tenn., and Vicksburg, Miss., in

a strip of country about 75 miles wide and 200 miles long. Some of the cotton produced here grades almost as high as sea-island. The fiber measures from 1¼ to 1⅞ inches in length, the yield per acre is about three times as great as sea-island, and its cost of production is less. Roller gins should be used in ginning this cotton, so that the fiber will be uniform and uninjured, but at present saw gins are used, often cutting and damaging it materially. This district was described in the June, 1911, issue of COTTON by Harvie Jordan in his article about the Delta planters.

During the year 1910 experiments made in growing a better staple of cotton in South Carolina met with such success that an organized effort was made this year to increase its cultivation. These experiments demonstrated that, where first-class seed of long-staple cotton had been used, the production per acre equaled or exceeded that of the short-staple, and was of such quality that it could be utilized by the mills in the state in competition with that brought from the Mississippi valley. A short resume of the efforts of D. R. Coker at Hartsville, S. C., was given in the October 1911 issue of COTTON.

The bureau has made diligent efforts this season to collect, through its local agents and by correspondence, reliable statistics of the quantity of upland long-staple cotton produced during 1910, classing as such, cotton which ranges 1⅛ inches and above. While reports have been received from numerous localities, indicating an interest in the production of this cotton, growers have not, as a rule, kept such records as enable them to supply the bureau with the accurate data desired. However, the result of the inquiry would appear to justify the estimate that the production of this cotton throughout the entire cotton belt amounted to about 300,000 bales, the states in the order of their position as producers of this fiber being Mississippi, Texas, Arkansas, and South Carolina, with smaller quantities reported from all of the remaining cotton-growing states.

The average price of upland cotton for the past 9 years has ranged from 8.20 cents in 1902 to 14.69 cents in 1910. Sea-island cotton grown in South Carolina sold in 1910 at an average price of 35.62 cents per pound, while the average for 1909 was 32.85; that grown in Georgia and Florida averaged 27.36 cents in 1910 and 27.10 cents in 1909. The grades known as Georgias and Floridas sold on the same terms. The average price of Egyptian cotton for 1910 was 22.25 cents, and relates to cotton imported into the United States prior to April 1, 1911.

The value of the cotton manufactures imported into Beirut in 1910 was about $7,250,000, of which England furnished $5,000,000 and Italy, Germany, and Austria $2,250,000. There is an opportunity for the introduction of American cotton manufactures.

A report from an American consulate in South America states that samples of cotton waste and prices f. o. b. Buenos Aires are requested by a person who states that he can dispose of 50 bales of 200 kilos (kilo = 2.2 pounds) each per month. The present price paid is $75 Argentine gold ($1 Argentine gold = $0.965 United States currency). For further information apply to the Bureau of Manufacturers, Washington, D. C., and refer to file No. 7245.

THE INDUSTRIAL ENGINEER.

What is an Industrial Engineer? What does he engineer, how does he engineer it and what results does he obtain? We all know the function of the civil, the mechanical, the electrical or the mining engineer; those men who study and harness for the use of mankind the forces of nature. They are the appliers of "Applied Science." But this does not tell us about this comparatively new species, the "Industrial Engineer." Perhaps a concrete example may best illustrate the functions exercised by him. The following case is chosen from one of many among the records of a firm of industrial engineers, as a typical problem presented by a large manufacturing concern and illustrates the broad field of endeavor covered by the industrial engineer.

The case in question is that of a large corporation owning three textile mills which on account of various factors and on account of peculiar market conditions had not been earning the dividends which they should for some time. The owners wished to know what could be done in order to put their properties on a firm footing. To do this the engineers approached the problem in the following manner: First they obtained by means of a detailed inventory the value of each mill separately. Second, they considered the possibility of the profitable running of the mills as a whole or as separate units. Third, they prepared plans and made recommendations for the reorganization and rearrangement of all the mills either as separate units or together. Fourth, they submitted an estimate of the cost to put each mill, or to put the entire property into first class shape. Fifth, they prepared estimates on the amount of capital required to operate the plant as a whole or each mill as a separate unit. Sixth, they made recommendations as regards the manner of selling the output.

It will be seen from the foregoing that the engineers had to study the problem from four sides, that of the mill architect and designing engineer as regards placing the value on the plant; from that of the operating engineer; from the point of view of the financier; and last but by no means least, from the point of view of the merchant. From the foregoing we may possibly formulate a more or less accurate idea of the function of the industrial engineer and the broad field of endeavor which he undertakes. He is not only the engineer of the forces of nature, but he must be the engineer of human beings, and in addition he must have a thorough working acquaintance with those intangible but most necessary factors of business, finance and selling. In a word, he may be likened to the coach of the football team upon whom rests the task of developing team play. A team may, of course, get together and make a creditable showing without the assistance of a coach, but in competition with the more highly specialized teams developed through proper coaching, the uncoached team will be at a big disadvantage. In these days of keen competition in business, it is only the manufacturer who is operating on the most efficient basis, who has the most effective team play and the most balanced plant, who will in the long run be able to last through the game and come out victorious in the end.

Rags and waste for making paper were imported by Germany in the first four months of 1911 in greatly increased quantity. The weight was 38,943,000 pounds, worth $758,268.

Mill Conditions and Market Reviews.

SOUTHERN MILL SITUATION.

(*Special Correspondence.*)

The year end situation among Southern mills is still far from satisfactory. The slump in the price of raw material has not had the desired effect of improving the situation obtaining when manufacturers were paying much more for their cotton. Some business has been put through, but usually dealings have been on a small scale, and on a low price basis. It is reported that certain yarn dealers have placed forward contracts at prices even below current quotations, but there seems to be a general inclination to refuse orders based on cut prices.

Each government report has appeared to picture the crop larger than before, but with low cotton, business is still languid, prices are unsatisfactory, and in many instances offer no profit on production, and orders are slow. Notwithstanding this fact, the majority of Southern spindles are running now. The curtailment period has passed and throughout the manufacturing centers of the South, mills are generally making regular time. Few, however, are making any great profit on operations on the present basis of cost and selling prices. It is still confidently hoped that spring will usher in a new business era.

One or two large failures have been reported, and several new mills have sprung into existence during the year. Up through the Carolinas, the various cities which are to be touched by the Dukes' new interurban railway system, are just now making a great bid for new factories, cotton mills, etc. On the night of the 28th the Greater Charlotte Club held a special meeting for the purpose of devising some means of bringing new industries to Charlotte. As a result the Greater Charlotte Investment Company, with a total capitalization of one half million dollars, has sprung into existence. It is proposed to bring to Charlotte one hundred and fifty thousand dollars worth of new enterprises. Special inducements will be offered prospective manufacturers by offering sites, taking stock, etc.

Being already an important cotton milling center, it is not be doubted that this organization will succeed in bringing to Charlotte other mills.

Greenville, S. C., another important point on the proposed Interurban, and an important milling center, has attracted to its bounds several million dollars worth of new enterprises during the present year, the majority being new cotton mills. And so the story goes in the other towns and cities of the Piedmont. High Point, Winston-Salem, and Lexington, N. C., are developing into important knitting mill centers and these towns have succeeded in locating a number of knitting mills recently.

Will the water-power trust ever become a menace to the Southern manufacturer and the Southern consumer in general? This is a question which has caused no little discussion of late. Various newspapers have discussed it knowingly, and some have even started a movement to "regulate" the several water-power "trusts" now operating in the South. Perhaps the more notable of the octopus tribe of this description are the Georgia Power Company and the Southern Power Company. It is pointed out by the advocates of regulation that the latter company with headquarters in Charlotte, is rapidly absorbing the stock of Southern cotton mills, and constantly developing itself into a "menace." It is a fact that this concern, owned principally by the Dukes, who are building a ten million dollar interurban railway system in the Carolinas, is to-day supplying a big percentage of Southern mills with power. Besides, it is said that this company is gradually extending its stock holdings in Southern mills, and it is predicted that eventually the Dukes will head the largest cotton mill corporation the South ever knew.

It is predicted by the often styled "alarmists," that while the bait of cheap power is getting many mills on the company's trading roll, that the time will come when evils will arise overbalancing the advantage of cheap power. It is urged that the several states pass laws providing for the regulation of power companies as they already have for regulating railroads. If it is against the law for a railroad carrying coal to own coal, is it not an equal crime for a power trust supplying mills to own mills? This is the query being fired forth from many sides. It may become a problem some day, but at present the majority of spinners are so busy endeavoring to make both ends meet that they are inclined to overlook the necessity of taking a stitch in time to safeguard them against the inroads of the power trusts.

What will Congress do with the cotton schedules? Even this question has puzzled some and has caused no little comment. Judging from reports that have been passed out it is not improbable that even yet, the cotton milling interests will be given a personal hearing by a congressional committee, before the present schedules are upset and rewritten.

South Carolina has been considering the proposition of marketing its cotton direct to Manchester, England, via Charleston, or some Southern port, and thereby of saving the extra freight and brokerage charges incurred by shipment to and from New York, via Liverpool, to Manchester. A representative of the Manchester Guardian has recently visited Charleston for the purpose of studying this proposition and Palmetto spinners are giving the subject serious thought.

After one year's debate and controversy the Railroad Commission of South Carolina has ordered a reduction in intra state freight rates of twenty per cent. At length the fight of cotton manufacturers has been rewarded. New rates are effective January 1st on all main lines.

NEW ENGLAND MILL SITUATION.

(*Special Correspondence.*)

As November draws to a close it is possible to record a general and steady improvement in the outlook. The sales of print cloths have been steady and at slightly improving prices. The business placed on denims and duck has been large, and there has been a better class of inquiry from the manufacturing trades. The conditions in the fine combed goods industry are poor for the time being, but in other directions the trend has been toward more activity of a healthy character.

The position of fine goods mills is due largely to the great increase in the producing capacity in the past few years. As the products are in a large proportion fine

fancies, for which a market must in many instances be created when new offerings are made, a prolonged uncertainty in purchasing power among the masses, or a change of moment in that fickle thing called fashion, brings about a halting situation out of which improvement comes slowly. Moreover, many of the mills built within a few years have started their looms on plain fine cottons, and the competition for business on them has driven prices to a lower relative level than has ever been known in this country since fine combed yarn fabrics have been freely offered from domestic mills.

Fine lawns, linens, batistes, etc., whether sold in bleached or converted styles, are bound to find their broadest markets in times when the masses are not economizing. The retailers of the country have been liquidating their surplus stocks of these cloths for many months and they have been slow in their preparations for the new spring trade. Reorders should have begun to come in freely on fine wash fabrics, and fine white and printed goods during November, but the volume of new business on secondary orders has been disappointing.

It is for this reason that fine goods centres, such as New Bedford, have not felt the impetus of improved trade of late, nor is it now expected that a much better business will come to hand until after the holiday trading is over with and retailers have taken their inventories in the latter part of January. A great deal of talk has been made among retailers that fine cottons will be very cheap after the turn of the year and a number of them have been influenced to hold off. The tariff agitation has also been given as a cause for a probability of lower prices, for it is popularly supposed that if tariff reductions are made the fine goods end of the industry will be hardest hit.

The fallacy of still lower prices being made for spring on fine cloths, and the tariff discussion having any positive effect in making manufacturers cut values that are already under a parity of reasonable profit, is appreciated by the larger distributers and by most others who have knowledge of the real conditions. Among other things, it is well known that fine long staple cottons are not abundant nor cheap and are not likely to be cheap for this cotton year. There is no possibility of reducing wage costs in mills while living costs are so high. Indeed, if the full products of New England mills were called for within a month, the wages now prevailing, which are the highest for many years, would not induce full complements of workers in the mills now built. The scarcity of fine cotton mill operatives is a very live issue with New England manufacturers at this time.

Despite these facts, however, the merchandise managers of many large retail stores will not permit their buyers to operate and manufacturers feel that the coming spring will demonstrate a paucity of supplies in fine fancy fabrics that will stimulate a demand and take care of prices regardless of tariffs, cotton, or other non-merchandising features.

The blanket and napped fabric mills are well supplied with business up to the end of the year and they will enter upon a new season in January with lighter supplies than they had a year ago. Lower cost cotton will make it possible to reduce prices for the new season and it is believed that the necessity for merchandise will beget orders promptly and will give the mills business enough to insure a period of steady running during the balance of the cotton year. The finer qualities of fancy cotton blankets have been in especially good demand and it is believed now that two of the largest mills engaged on these fabrics will find it necessary to add to their equipment before the year of 1912 closes.

There has been a good advance business done on the better qualities of fine converters' drills and sateens and some of the leading mills have business booked on these cloths well into the spring months. Wide sheeting mills are running in full. Looms engaged on pillow tubings are busy. Mills engaged on heavy drills and sheetings for export are still shipping goods regularly to various ports and there has been no interruption with deliveries on orders in hand.

In the last week of November, Fall River sold 610,000 pieces of print cloths and convertibles. Prices in the New York market had dropped to a basis of 4 cents for 38½ inch 64x64s, and 2 11/16 cents for 27 inch 64x60s, but at the close of the month the losses of the month were recovered and quotations were based on 4¼ cents for wide 64s and 2 13/16 cents for 27 inch goods. On 39 inch 68x72s, prices were quoted at 4⅞ cents bid and 5 cents asked with some sales made at the latter figure. The demand was the broadest of the year. It included calls from bleachers, printers, converters, and from the bag trades, while quite a few handlers of corset coverings and other miscellaneous cloths deemed it wise to operate.

Bleached cottons have held a basis of 8½ cents for Fruits during the month. It is now anticipated that a revision to a lower basis will be made early in December, when jobbers are ready to buy for spring. Unbranded bleached cottons were sold at irregular figures during the month, 4-4, 64s being quoted as low as 5 cents. The B. B. & R. Knight mills have been running four days a week during the month, but it is stated that they will begin full operations within a short time. The bleacheries have been pushed hard on some goods, but they could handle a great deal more business if it were tendered. There is a steady business passing in welts, voiles, poplins, bedford cords, and other fancy white and colored fabrics and the finishers are being hurried on deliveries of this class of merchandise.

Colored cottons have been distinctly better during the month and working suit fabrics are now well conditioned up to the early spring months. Shirting chambrays are well under order, especially the heavier grades. Staple tickings are sold up for some weeks ahead. The denim mills have booked a good business since the last reports.

There is still uncertainty in some gingham circles. The spring orders have not been wholly satisfactory in some mills although the larger producers have all they can handle. Red Seal ginghams are to be offered for fall delivery, beginning in January, and the price named is to be the one now current. This feature of the gingham situation has led merchandise men to think that prices will be held steady all through the early spring trading. At the same time, more business could be cared for on certain lines of staples and dress ginghams. Shirting fabrics have not been reordered as freely as mills were anticipating and attention is now being given to sampling for a new season. Many shirting looms are idle, but principally those engaged on the finer qualities.

Staple prints have been selling very well for export and the domestic market has been ordering in small lots in a steady way. The American Printing Company is running regularly and notice was given by the owners that the Fall River Iron Works mills, which supplies the company with

70,000 pieces of gray cloths a week, will run steadily in the future, and for an indefinite period. The year's business in export prints to date has been the largest in the history of the trade. The printers engaged on the finer cloths have not been rushed, although they are still busy on orders. Machines on percale are running steadily, and in some instances, overtime, to hasten January deliveries.

Crashes, towellings, quilts, and heavy fancy goods have been selling well for future delivery and the leading mills are comfortably fixed with business for the winter. The mills engaged on fine colored yarn fabrics, for the wash goods departments of the retail stores, have not been getting as satisfactory duplicate business and some looms with warps in are standing idle for the moment. The Rhode Island lace and netting mills have been getting orders more freely since October and are generally busy. The corduroy and velvet mills are pushed to their capacity as they have been for some time.

Machinery men report that it is still very difficult to close new business. Most of the large concerns are running short time and are anticipating a slack winter unless the spurt in trade during the past two weeks gives courage to some men who are planning work ahead. The dye and drug firms report that they have been getting a much better line of inquiry since October and they are predicting a better trade than they have had this year, basing it largely on the tone of inquiries received from mills that have been buying very cautiously for many months.

It would be pleasant to add a word of good cheer from the mill meetings that have taken place since the last report. But the plain truth is that stockholders listened to some of the most unsatisfactory financial statements that have been issued since the late '90s and their main hope now is that the disorganizing effect of extremely high priced cotton has passed for some time to come.

Manufacturers, as a rule, have not bought cotton liberally. There are some mills, whose managers are enforced to accept their kind of cotton when they can get it, who have made a move for some distance ahead. But on the whole, New England manufacturers are not settled that cotton may not be cheaper in March or April when a new crop is being planted, and until they find that cloth buyers intend to have goods at fair prices they incline toward conservatism in cotton operations. The current price of 9½ cents to 10 cents for print cloth grades is not above the ideas of most mill men if trade is right. But for the moment they are skeptical of the strength of the demand for cloth for long future delivery, and when their mind is settled on that point it will not be surprising to find mills buying cotton and permitting the speculator to do his work with other men's holdings.

MONTHLY REVIEW OF THE COTTON MARKET.

BY H. N B. BEER, NEW ORLEANS.

One month ago we were disposed to take a more favorable opinion of the cotton market, and expressed the opinion that purchases made on any further decline of importance would probably be profitable. At that time the average of crop estimates was for a yield of about 14,500,000 bales. In the meantime the weather in the South has been favorable for gathering, ginning and marketing of cotton and for maturing the "top" crop. The result is that crop estimates have been increased 500,000 to 1,000,000 bales, now ranging from 15,000,000 to 16,000,000 bales. Therefore, although the market has not declined very much since one month ago, it now looks as if it is to go lower, especially if estimates for a commercial crop in excess of 15,000,000 bales is confirmed by the Government crop estimate, due December 11th, as such a yield would be possible since the Bureau report does not include linters, etc. In other words an estimate on the part of the Bureau looking to an actual growth of about 14,500,000 bales, would provide a commercial crop of about 15,000,000 bales, and an estimate of about 15,000,000 bales actual growth would point to 15,600,000 bales, as about 600,000 bales additional would have to be allowed for linters, etc.

However, while we feel less confident of the future of the market than we did last month, we still feel friendly to the staple, as we do not anticipate any further decline of importance unless future indications point to a commercial crop of about 15,500,000 bales, and in that event it is possible that prices might eventually touch the eight cent level, but this is only a remote possibility, not a probability. In the meantime it looks as if the market is on the eve of establishing a new low level for the season, and it is on such low levels that it might be advisable to buy, and would be an opportunity especially favorable to spinners, who after all endeavor to buy at an average price that will make their business profitable, and at any price under nine cents, basis of middling, would surely be inviting to commence buying for future requirements.

The lowest levels of the season are apt to be reached before the close of the current year, for with the turn of the new year attention will be attracted to the probability of the South making a big reduction in the acreage next Spring in order to advance the price of the surplus of this crop, which is estimated at 1,000,000 to 2,000,000 bales, and which farmers will probably hold for higher prices. Exports to Europe this season will probably reach the very large total of about 9,000,000 bales for the first time in the history of the trade, as the Egyptian crop is reported short of last year by about 500,000 bales, and it is said that the crop in India will be 500,000 to 1,000,000 bales short of last year's production. It is to be presumed, therefore, that America will be drawn upon to make good the shortage in foreign crops. The United States will probably need 5,000,000 bales for domestic mill consumption. This would bring the world's requirements up to about 14,000,000 bales of American cotton. Under the circumstances it would not be a difficult task for the South, which is better off financially than ever before, to take care of the surplus of this crop, be it 1,000,000 bales or 2,000,000 bales.

There was issued to-day a report by the United States Census Bureau on the supply and distribution of cotton in the United States on November 1st. The supply was put at 10,585,000 bales, against 8,046,000 bales last year, and of this amount the total stock in America at the close of October was 7,375,000 bales compared with 5,251,000 bales in 1910, an excess over last year of 2,124,000 bales. It was noted however, that spinners stocks in America were not very heavy, compared with last year the Southern mills held 417,000 bales against 355,000 while the mills of the North held more stock than one year ago, 366,000 against 340,000. These stocks represent only about seven weeks' supply for American spinners, and they will do well to buy for next year's wants, especially if the cotton can be had at a lower level, or say under nine cents.

THE KNIT GOODS MARKET.

While the situation in the hosiery market was fairly good through most of the month and while the wave of cold weather that swept over the country during the middle of the month, caused a quick demand for spot knit goods in the underwear line, the reports in the hosiery trade are conflicting as to whether business is really good or merely marking time. There is a general report from underwear salesmen that they are meeting with little encouragement, although some manufacturers claim that they are doing a satisfactory business. Many of them, however, admit that a considerable portion of their orders are without any specifications. There is an impression among many underwear salesmen that the jobbers are living up to an understanding which they had at the time of the meeting of the jobbers' association, and in which they decided not to do any amount of buying of next fall merchandise before a fixed date in December. There is some fear entertained in some parts of the market, lest manufacturers resort to price cutting in order to get business. A repetition of the balbriggan campaign of a few months ago is regarded as not unlikely.

The month opened with hosiery fairly strong, but no particular line seemed prominent. There was a demand for a good volume of duplicates, but mostly in the line of heavy weights. The demand for mercerized lines was somewhat increased, although there was still many orders received for the thin gauzy material which has characterized the entire year so far. The underwear market continued spotty and about the only sales of importance that were made, were for spot goods and were usually governed by the state of the weather in the particular locality of the buyers' customers. The salemen were not enthusiastic about going out on the road in this part of the month and no one expected much business on initial trips. The sweater men were out and were taking some orders, but the hosiery trade was still uncertain as to the opening date for their new stock. The belief seemed to be strong among the salesmen that the trip they were going to make would be largely a missionary one. Some new styles in mufflers and capes have been put on the market and the sweater people are expecting a fairly good season again this winter.

Most of the attention was fixed on the trade for next fall. In underwear the indications are that the union suit will be stronger next year than it has ever been and many manufacturers claim that the East is beginning to appreciate the union suit as well as the West. The women's union suit is expected to be especially good, because owing to the tight fitting garments women are wearing, it would be more comfortable than the two piece suit. It is not probable, however, that these lines will become popular in the Southern states as the winters here are too mild to make such garments appreciated by the majority of wearers. A fair amount of repeat orders were received during the middle of the month and good reports were received from many quarters of the underwear, hosiery, and sweater trades. Several mills report that they are three and four weeks behind in deliveries. Prices on cotton underwear were somewhat lower than was expected, but the initial business did not show up very strong, in any line.

One of the reports that attracted considerable attention during the middle and last of the month was to the effect that many underwear manufacturers that were out for next fall business, were guaranteeing prices, so that the buyer who places an order now is given the assurance that he will be protected against a revision of prices. This guarantee, it is understood, holds good only as far as the house making the sale is concerned. The wave of cold weather that swept over the country during this period caused a flurry in the demand for knit goods of all kinds for prompt delivery. There was urgent demand for fleeces and many buyers were unable to obtain immediate shipment and had to be contented with promises of from two to six weeks delivery. The demand for toques, shawls, cardigan jackets, sweaters, and similar goods was considerably improved at the close of the month and there is very little doubt in the minds of most market observers that the settling of good, snappy winter weather will bring out considerably more buying than has been seen up to the present time. Many retail buyers are prone to wait until after the holidays before making large purchases of winter underwear and in the meantime are making use of last winter's left overs. This is reflected from the customers to the retail stores and through them to the wholesaler and jobber as a result of a hand to mouth buying which has predominated throughout the entire year.

A recent arrangement made by some prominent manufacturers of union suits will doubtless be of interest to the underwear trade. The Cooper Manufacturing Company, of Bennington, Vt., have just taken out a license to manufacture the closed crotch union suit which has made such a stir among the furnishing trade of some sections during the last year. The Cooper Manufacturing Company are licensed to make the closed crotch union suit for men in their well known spring needle fabric. Penman's Limited, the largest knit goods manufacturers of Canada, have a license to make the closed crotch unions in Canada for men, women and children, and also in sleeping garments. The Goodenow-Brookfield Knitting Co., of Kansas City, Mo., have a license to make union suits in the closed crotch pattern in nainsook and woven fabrics which are so popular for summer wear. While the Cooper Underwear Co., of Kenosha, Wis., who originally brought out the "Klosed-Krotch" union suit for men, and made it so popular this year, have a license to make men's knit union suits in all grades, but make a specialty of men's flat knit athletics ranging in price from $8.50 to silks at $84.00 per dozen, selling direct to the retail trade. Factories are yet to be licensed to make in the "United States" ladies' and children's union suits and sleeping garments. It is predicted by some that within five years, none of the old style open crotch union suits will be saleable when the new closed crotch pattern has been thoroughly introduced.

President W. P. G. Harding of the first national bank of Birmingham, Alabama, has given the cotton planters of the country some very sound advice in his address before the Montgomery convention. He doubted the expediency of attempting to set a minimum price at which cotton must be sold, believing rather that it was better to get all that the cotton was worth rather than to hold for arbitrary prices. Market gradually, was the slogan he advised them to adopt and when the price was not satisfactory, to hold on to the balance until the price agreed with their own personal ideas and needs. Such advice as this is well worthy of consideration.

THE YARN MARKET.

The yarn market for the past month has shown some indication of improvement and the bulk of business transacted has, generally speaking, been good. The prices for future delivery yarns are, however, still a debated point between the buyer and seller. The buyers have the idea firmly fixed in their minds that prices for future delivery will later be revised to a lower point, while the sellers on their side declare that prices have already been revised and lowered by the manufacturer, even before the price of the raw staple itself was brought down to a lower basis. The manufacturer's profits are at best merely nominal, and any further price revision on their part would practically mean the trading of an old dollar for a new one. It is very doubtful that further revision will be made by the majority of yarn manufacturers.

The month opened with a moderate volume of business, although the knit goods trade did not show any material improvement in the orders they were sending in. The cause for this is probably because some of the largest jobbing houses had not placed their orders with manufacturers for light weight underwear for spring delivery up to this time and while they had selected styles that they probably intend to buy, they have refused to give the selling agents any orders. This is delaying the knit goods manufacturers in the placing of their orders, inasmuch as they do not care to stock up on yarns unless they have the orders in hand to convert same into goods. The actual market conditions which have been maintained through the past few months and which were still showing strongly through this period of the month, has been entirely caused by the conservative buying throughout the entire country. There were many orders for weaving yarns received during this period of the month, mostly for quick deliveries and in many cases dealers had to refuse these orders as they were unable to get the yarns from the spinners in time to make the delivery which the buyers dictated. Deliveries on old contracts during this period of the month continued good. The price situation was, however, far from settled. Southern spinners remained firm on prices, although there was some easing off by those who needed business. The wide range of prices quoted during this period of the month, was claimed by some to be due to commission cutting and by others to short selling. It was very difficult to determine from the outside, just what was causing the fluctuation in prices.

The middle of the month showed practically no improvement as far as the unsettled condition of the market was concerned. The bid prices for cotton yarns gradually slid down to lower levels, but very few orders were placed at the prices quoted. Whenever some buyer came into the market for a spot lot he had to meet the sellers' prices or go without his yarn. Considerable forward business was reported to be pending on the market and it is probable that as soon as buyers are reasonably certain that the prices have reached the bottom, contracts will be forthcoming. In the meantime, both the buyers and the sellers are following the raw material market closely. Some fair size sales took place during this period of the month for future delivery, some few of them reaching 25,000 to 50.000 pound lots. There was some demand for coarse numbers for the heavyweight underwear trade, but the hosiery trade continued spotty. The conservatism in other trades was continued into the weaving trade and it is probable that the uncertainties which are still hovering over the tariff revision question is responsible for the extreme conservatism being shown by many manufacturers of staple goods. Carpet manufacturers will soon be in the market for yarns, and it is to be presumed that they too will be looking for low prices.

Roving and sweater yarns were in better demand during this period and continued so throughout the balance of the month. The cold snap that came on about this period of the month was probably responsible for the sharp increase in this section of the market. The roving yarns were in better demand than at any time during this year and the knitters were so anxious to secure same that spinners had no difficulty in obtaining the full asking prices for spot goods. There were no accumulations of these yarns on hand, however, and many orders had to be turned away or delayed deliveries made on them. Some manufacturers were complaining about not being able to deliver goods on contracts placed some weeks ago, and other manufacturers were not at all optimistic about the business for the winter. Some believe the first of the year will see a falling off in the demand for finished goods, while others are firm in their belief that the coming year will be a good one, if the tariff is not tampered with too strongly by Congress during its next session. If the manufacturers stick to their present determination to hold prices steady and manufacture at a profit, it will unquestionably be only a compartively short time when the buyers will have to meet their terms. It is probable that cotton, the staple, will go very little if any lower than at present quoted and in all probability after the first of the year, the prices will reflect an upward trend.

The New York quotations for the close of the month are as follows:

SOUTHERN SINGLE SKEINS.

4s to 8s	15½@16	20s	18 @18½
10s to 12s	16 @16½	24s	19 @19½
14s	17 @17½	26s	19½@20
16s	18 @18½	30s	20 @20½

SOUTHERN TWO-PLY SKEINS.

4s to 8s	15½@16	30s	20½@21
10s to 12s	16½@..	36s	24 @25
14s	17¼@..	40s	26 @27
16s	17½@18	50s	33 @..
20s	18½@..	60s	41 @42
24s	19 @19½	3-ply 8s upholstery	17 @..
26s	20 @..	4-ply 8s upholstery	17 @17¼

SOUTHERN SINGLE CHAIN WARPS.

10s to 12s	16½@17	24s	19 @19½
14s	17 @..	26s	19½@20
16s	17½@..	30s	21 @..
20s	17½@18	40s	28 @..
22s	19 @..		

SOUTHERN TWO-PLY CHAIN WARPS.

8s to 10s	16½@17	26s	20 @20½
12s to 14s	17 @17½	30s	20½@21
16s	18 @18½	40s	27 @28
20s	18½@19	50s	32 @..
24s	19½@20		

SOUTHERN PEELER FRAME CONES.

8s	16½@..	18s	18 @..
10s	16½@16¾	20s	18 @..
11s	17 @..	22s	18½@..
12s	17¼@..	24s	18¾@..
14s	17½@..	26s	20½@..
16s	17¾@..	30s	21 @..

The July imports of the great general group of cotton "laces, embroideries, etc.," amounted in value to over 2½ million dollars for the single month, of which embroideries were 1 million, laces and lace articles 1¼ million, lace window curtains a hundred thousand dollars, nets and nettings 140 thousand, while hand-made laces amounted to but 35 thousand dollars.

COTTON MANUFACTURING.

THE MANUFACTURE OF COTTON QUILTINGS.

A Brief Description of the Handling of this Interesting Branch of Textiles, With Carefully Drawn Lay-Outs of the Types Illustrated.

(*Contributed Exclusively to* Cotton)

by "weberel."

A study of the manufacture of cotton quilting fabrics leads to a discussion of some of the most interesting features of cloth structure. As is well known warmth and bulk are amongst the chief requirements in quilting fabrics, but their wearing properties must also be taken into account. The simplest type of quilting is that known as the honeycomb quilt which is merely a brocade cloth developed in honeycomb styles in very coarse yarns. Fig. 1 shows a portion of a honeycomb quilt whilst Fig. 2 is a section of this fabric developed on point paper to show the class of

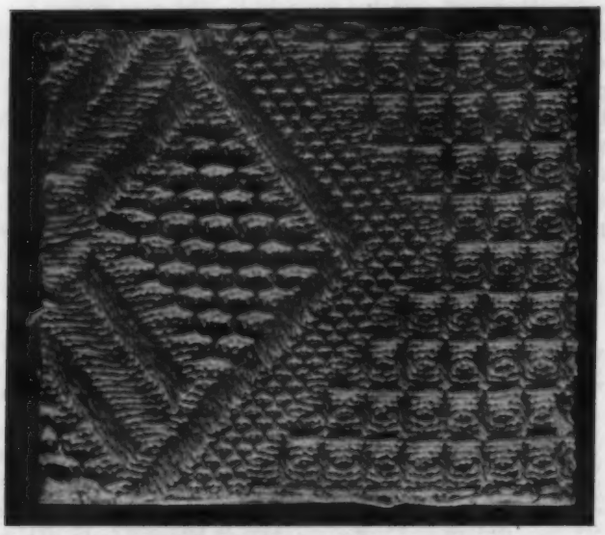


Fig. 1. Structure of Honeycomb Quilt.

weave used. Owing to the restrictions imposed by the setting and class of yarns used in these fabrics the ornament is restricted to rectilinear designs, that is, the design must be developed on a geometric basis using only straight lines. For this style of cloth the usual heavy loom is used mounted with a six, eight or twelve hundred hook jacquard. Bleached yarns in both warp and filling are used; the warp yarn is always of two or more ply whilst in some cases the filling is also two ply.

Another simple type of quilting is known as the "Alhambra" of which Fig. 3 is an example. This is really a plain cloth composed of coarse filling and fine warp upon which an all-over extra warp effect is developed. The extra warp effect is generally of blue or red, but in low qualities a large variety of gaudy colors are often used. These extra figuring threads are controlled in groups of not less than four threads from the jacquard, whilst the first warp that forms the ground is controlled by healds in front of the harness as indicated in the tie-up shown in Fig. 4 on the

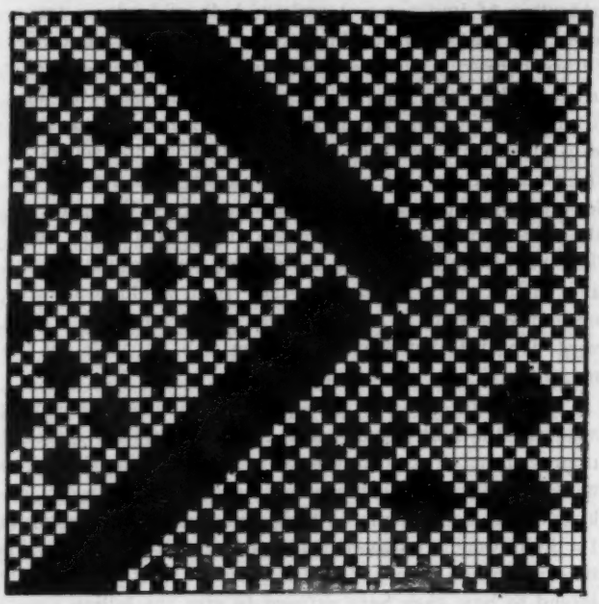


Fig. 2. The Developed Pattern of Fig. 1.

left; four picks of the lifting plan are shown on the right. Fig. 5 shows a section of Fig. 3 worked up on point paper. The ornament in this class of fabric is limited to a certain degree and only coarse effects can be successfully developed. A heavy loom is required for this style of cloth and a jacquard with a large figuring capacity is essential. A two beam arrangement is also necessary as the fine white ground warp must be held at greater tension than the figuring warp. A common make is as follows:

Fifty-six ends per inch in warp consisting of 28 white and 28 colored, 2/40s ground warp, 2/20s figure warp, 30 picks per inch, 5s soft condenser filling.

The "Marseilles" quilt is a true evolution of the old idea of quilting. It consists of two plain cloths, between which a series of coarse wadding picks are placed, stitched together. The stitching together of the cloths delineates the pattern

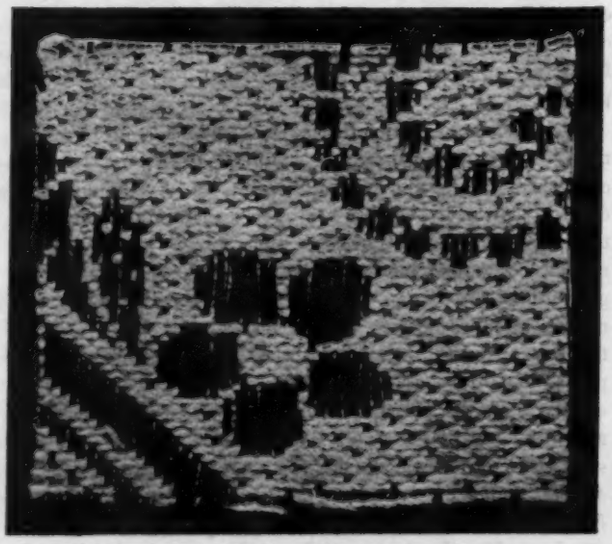


Fig. 3. Alhambra Type of Quilting.

which is in general of a diagonal character, the binding points forming depressions in the cloth. Fig. 6 shows a section of this structure whilst Fig. 7 is a portion of a design showing the working of each spearate end and pick. The warp threads are arranged as shown on the left in Fig.

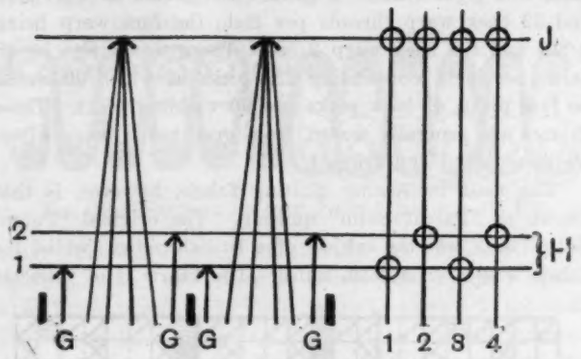


FIG. 4. THE "TIE-UP" OF THE FINE WARP THAT FORMS THE GROUND IN FIG. 3.

8. Those threads drawn through the four healds in front control the face warp. The back warp is partly under the control of two healds, two comberboards, above which the harness threads are knotted, and the jacquard machine. The front healds make the face cloth, and the back pair of healds and the boards make the back cloth. The jacquard simply controls half of the back warp threads for figuring purposes and is lifted on the first two picks in each set for binding the two cloths together.

A consideration of Fig. 7 in which crosses indicate the working of face ends on face picks, dots indicate face ends lifted on back picks and circles indicate face ends lifted on wadding picks. This, together with the lifting plan on the right in Fig. 8 will show how the cloth is constructed. In Fig. 7 strokes indicate the working of back threads on back picks and solid squares show where the jacquard lifts back threads for binding purposes. The numerals in the section given in Fig. 6 correspond to the position of the warp and filling in Fg. 8. The loom used for weavng this class of quilting is provided with cams at the side for controlling the jacquard, comberboards and healds. These cams are ten to the round and one card for the jacquard machine serves for ten picks, thus the small design given in Fig. 7 represents three cards and three hooks of the harness. The back warp is carried on a separate beam and held at great tension in order to emphasize the embossed effect.

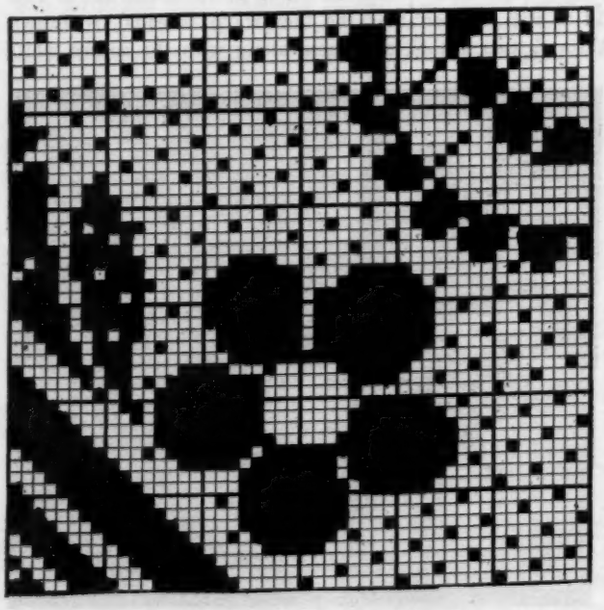


FIG. 5. SECTION PLAN OF FIG. 3.

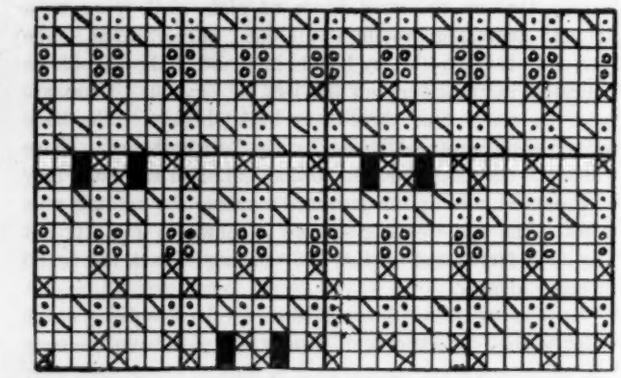


FIG. 7. PORTION OF A DESIGN SHOWING THE WORKING OF EACH SEPARATE END ON FIG. 6.

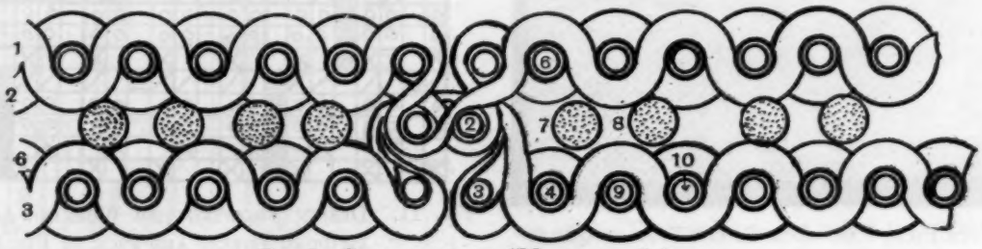


FIG. 6. SECTION OF THE "MARSEILLES" QUILT.

A subsequent development of the "Marseilles" quilt was the "Toilet" quilt of which there are several types, embracing loose, half-fast and fast backs. They are also characterized by the number of picks inserted for each jacquard card, viz, 3, 4 or 5 pick "Toilets." An example of a five pick "Toilet" fast-back type is shown in Fig. 9, in which it will

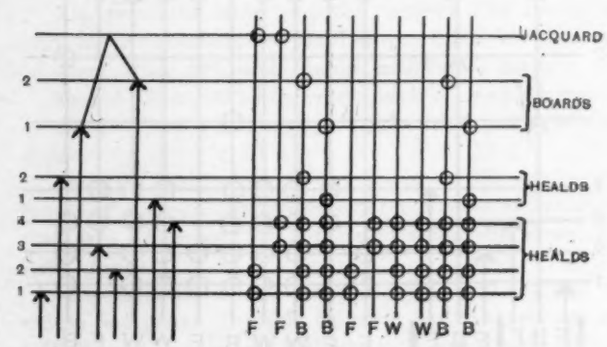


FIG. 8. THE "TIE-UP" FOR A MARSEILLES QUILT.

be seen that an embossed figure of plain cloth lying on a flat and depressed ground is the chief characteristic. The face cloth is controlled by healds in front of the harness as indicated in the tie-up on the left in Fig. 10. There are twice as many face threads as back threads. The back warp threads are controlled by two comberboards, above which the harness is knotted so that the plain fast-back may be produced, and by the jacquard machine for binding purposes. The full weaving scheme is shown in Fig. 10, but Fig. 11 is introduced to show the working of each individual thread and pick.

In weaving this cloth one card serves for five picks, but in order to save the expense of a pick and pick loom the complete weaving scheme is arranged on two cards or ten picks. The face and back filling are run in from the same shuttle but the wadding filling is of coarse counts. Fig. 11 shows a small diamond effect in which crosses indicate the working of the face threads when face filling is inserted; circles indicate all face threads lifted when wadding filling is introduced; and strokes indicate all face threads lifted on back picks. Shaded squares indicate the lifting of the back warp threads by the comberboards to produce the plain fast-back whilst solid black squares indicate back threads lifted by the jacquard for binding or figuring purposes.

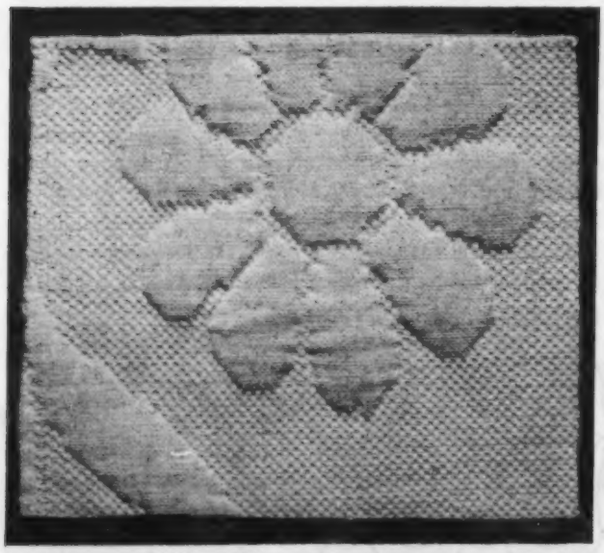


FIG. 9. FINE PICK, FAST-BACK TOILET TYPE OF QUILT.

The back warp is on a separate beam and is heavily weighted in order that the best effect can be obtained. Tappets at the side of the loom control the working of the jacquard machine, the comberboards and the healds. These tappets are ten picks to the round. Fig. 11 represents four cards and eight hooks. A good Toilet would have 64 face and 32 back warp threads per inch, the face warp being 2/80s and the back warp 2/50s. There would also be 45 cards per inch representing 225 picks of which 90 would be face picks, 45 back picks and 90 wadding picks. These fabrics are generally woven from grey yarns being afterwards bleached and fringed.

The most interesting quilting fabric, however, is that known as "Patent Satin" quilting. The original "Patent Satin" quilt was the subject of a British patent, whilst the fabric was given a satin finish. The fabric is of intricate structure, consisting of two plain cloths bound together and united in the scheme of ornamentation so as to make an exceedingly useful and good wearing quilt. Fig. 12 shows a typical example of this class, and Fig. 13 shows a section of the fabric in order that the construction may be clearly explained. From the tie-up given on the left in Fig. 14 it will be seen that the face warp threads are drawn through two healds, and these along with the coarse white

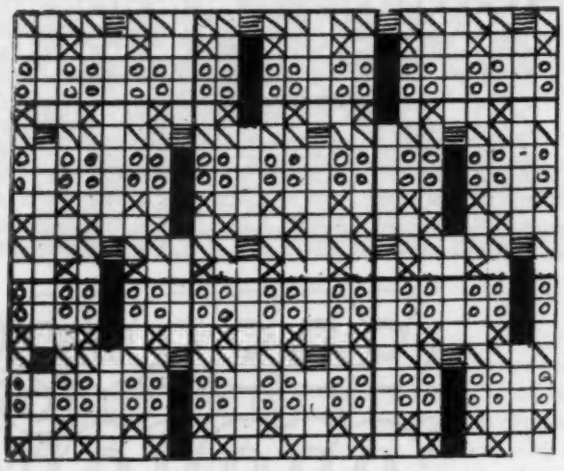


FIG. 11. DESIGN SHOWING THE WORKING OF EACH INDIVIDUAL THREAD AND PICK IN FIG. 9.

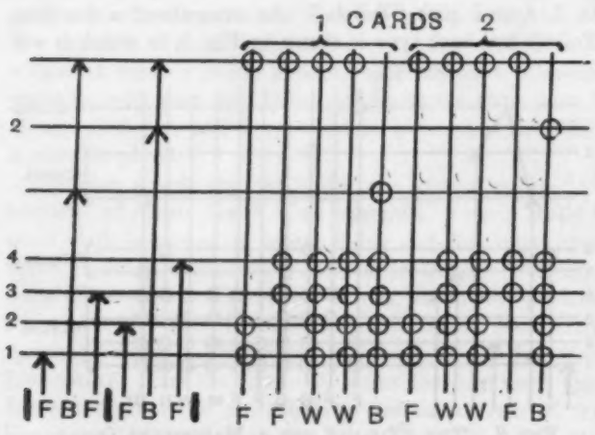


FIG. 10. "TIE-UP" FOR TOILET QUILT SHOWN IN FIG. 9..

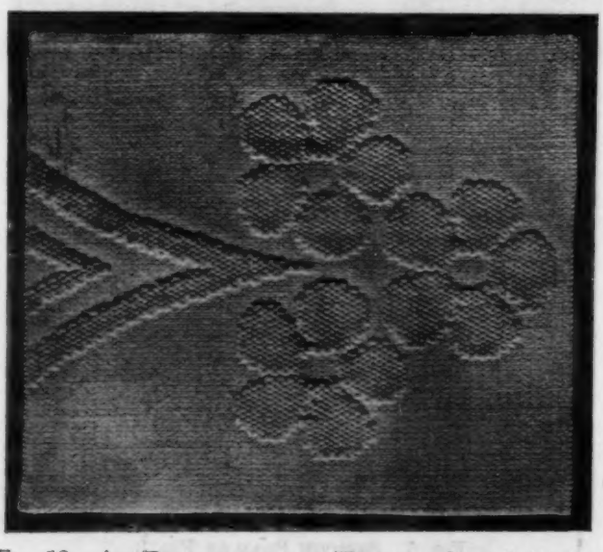


FIG. 12. AN EXAMPLE OF THE "PATENT SATIN" QUILT.

weft make the figure portion of the design. The face warp threads are controlled by the harness which is knotted above the comberboards in order to make the ground plain cloth; in addition to this, the two back warp threads on each side of a face thread in one dent are controlled by the same

FIG. 13. SECTION OF THE FABRIC SHOWN IN FIG. 12.

hook. These face warp threads are left *down* when the figure is formed and raised on coarse picks by the jacquard when the coarse figuring cloth has to be thrown to the back. The lifting plan shown on the right in Fig. 14 indicates that one card serves for four picks, viz., two fine and two coarse filling. The construction of the cloth is shown in Fig. 13 where the solid black threads are indicated as

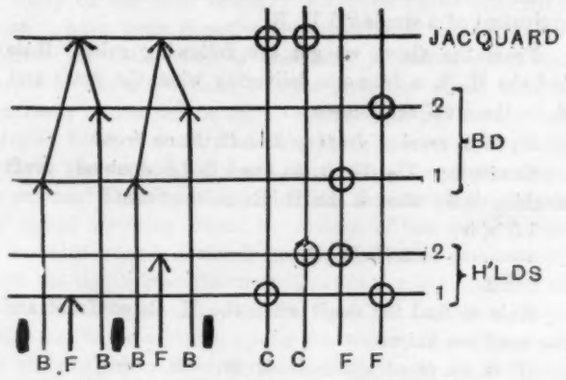


FIG. 14. THE "TIE-UP" FOR FIG. 12.

making plain cloths with black filling (figure) and at the same time the black threads (face) are interweaving with the fine back picks that make the ground.

Fig. 15 indicates the weaving of alternate stripes of figure and ground and represents the detailed working of two cards and eight jacquard hooks. The circles represent the face warp threads interweaving with coarse weft to make the figuring cloth. The crosses show the weaving of back warp threads on fine picks, making the ground. Dots indicate how the face warp threads are lifted over fine picks to bind the cloths separately together, whilst solid

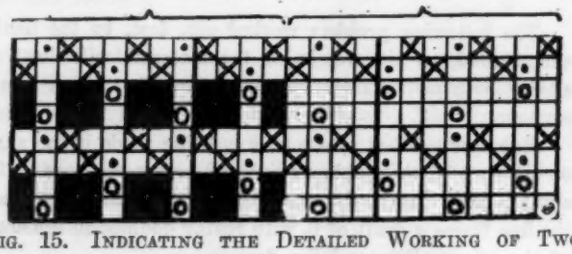


FIG. 15. INDICATING THE DETAILED WORKING OF TWO CARDS AND EIGHT JACQUARD HOOKS.

squares show the jacquard controlling back threads raising them over coarse white filling, so as to leave the ground portion quite flat and depressed. The loom used to weave these fabrics is provided with a double box at one end and the jacquard, comberboards and healds are worked from tappets at the side of the loom so constructed as to act as indicated in the lifting plan on the right of Fig. 14. Good working particulars for a quilting of the above character would be:

84 back and 42 face threads or 126 threads per inch, 2/50s face warp, 2/30s back warp, 27 cards per inch or 108 picks, 20s fine filling, 6s coarse filling.

The many special harnesses used for quilting fabrics enable them to be produced quite cheaply owing to the low cost for designing and card cutting. If these compound fabrics were woven on an ordinary harness they would entail in many cases, jacquards of large capacity with a consequent increase in designing, card cutting and expenses. Their production is confined generally to a few mills, but given a knowledge of the conditions under which they are produced would enable a designer or superintendent with up-to-date ideas to open out a new and profitable trade.

COTTON MILL MACHINERY CALCULATIONS.

METHODS OF FIGURING HANKS AND NUMBERS WITH RULES AND PRACTICAL EXAMPLES.

(*Contributed Exclusively to* COTTON)

BY B. M. PARKER.

PART X.

The machines following the drawing frames are called fly frames or roving frames. This is simply a continuation of the drawing process, but with the idea of gradually reducing the bulk of the material to a suitable size and putting it in a convenient form to be used on the spinning frames. Three processes of fly frames are usually used though, in coarse work, two processes is the general rule and sometimes only one, while in making fine yarns four processes are used. The machines are called the slubber, the intermediate, the fine frame and the jack frame, each having the same end in view and being built to handle material of gradually decreasing bulk. In the mills the fine frames are spoken of as speeders and the names coarse speeder and fine speeder are often used to designate the intermediate and fine frames.

Up to this point we have dealt with the weight of the product of the different machines, expressed as ounces or grains per yard, but, when we reach the fly frames, the product is referred to as roving and we no longer use its weight to designate its size but use a different system, the size of the roving being designated by the hank and spoken of as a certain size hank roving: as four hank roving. So, before taking up the calculations on the fly frames, it is best to give a review of this system, together with some rules and examples that will be needed when working with hanks.

The principles underlying the numbering of roving or yarn are the same and are based on two fundamental facts:

First—That 840 yards always constitute a hank.

Second—That 840 yards, or one hank, of one hank roving or number one yarn, always weighs 7,000 grains or one pound.

Then the hank or size of any roving, or the number or counts of any yarn, corresponds to the number of hanks of that yarn or roving that it takes to weigh one pound, or 7,000 grains.

If we measure off 840 yards of roving and find that it weighs one pound, it would be called one hank roving, or 1 H. R., and one yard of it weighs 8.33 grains, as: $7{,}000 \div 840 = 8.33$.

If we measure off 840 yards of roving and find that it weights one-half pound or 3,500 grains, it would be called 2 H. R., because it takes two hanks of it to weigh one pound, and one yard of it weighs 4.166 grains, as: $3{,}500 \div 840 = 4.166$.

When we speak of 10 H. R. we mean that it takes 10 hanks of it, or $10 \times 840 = 8{,}400$ yards, to weigh one pound. Then it will be seen that the hank of the roving or the counts of the yarn refer to the number of hanks that it will take to weigh one pound.

By dividing 7,000 grains by the weight, in grains, of one hank, or 840 yards, of any roving or yarn, we get the hank or counts of that roving or yarn. As it is not necessary or convenient to measure off 840 yards when sizing our roving or yarn, it is customary to reel only 12 yards of roving and divide its weight in grains into 100 and to reel 120 yards of yarn and divide its weight in grains into 100, as 12 and 120 bear the same ratio to 100 and 1,000 as 840 does to 7,000.

Example. If 12 yards of roving weigh 25 grains, what is its size or hank? $100 \div 25 = 4$ H. R.

Example. If 120 yards of yarn weigh 40 grains, what is its size or counts? $1{,}000 \div 40 = 25$'s yarn.

In dealing with odd lengths of yarn or roving, the following rule will be found useful and is the basis of several others:

The number of yards of roving or yarn $\times 8.33 \div$ *weight in grains of the length taken = the size.*

Example: If 20 yards of roving weigh 33 grains, what is its size?

$$\frac{20 \times 8.33}{33} = 5 \text{ H. R.}$$

One thing must be borne in mind when dealing with hanks and counts: The larger the H. R. the less it weighs per yard and the greater the number of yards or hanks it takes to weigh one pound; and the smaller the H. R. the greater the weight per yard and the less the number of yards or hanks it takes to weigh one pound. For instance, a 2 H. R. weighs 4.166 grains per yard and there are 1,680 yards or 2 hanks to one pound, while a 6 H. R. weighs 1.388 grains per yard and there are 5040 yards or 6 hanks to one pound.

The weight per yard of any roving can be found by dividing 8.33 by the hank of the roving, and the weight of 12 yards can be found by dividing 100 by the hank of the roving.

The following rules and examples will be found useful in figuring drafts and numbers on the fly frames. In figuring on the slubber, the material on the back is expressed by the weight per yard and this must be reduced to hanks, by dividing this weight into 8.33, to correspond with the roving on the front, or the weight of the roving on the front can be figured in grains per yard and this weight reduced to its equivalent hank roving.

Example. If the sliver on the back of the slubber weighs 60 grains per yard and the draft of the machine is four, what is the H. R. delivered on the front? $60 \div 4 = 15$ grains. $8.33 \div 15 = .55$ H. R.

In this case the weight on the back of the slubber is divided by the draft, which gives 15 grains per yard as the weight of the roving. Then 8.33 divided by this weight will reduce it to its equivalent hank.

From the hank roving on the front of the slubber and the draft, it is easy to figure the weight of the sliver on the back by the following rule:

Divide the H. R. on front of slubber by the draft and divide 8.33 *by this number.*

Example. A slubber has a draft of four and is running a .55 H. R., what is the weight of the drawing sliver on the back? $.55 \div 4 = .1375$. $8.33 \div .1375 = 60$ grains.

In working with the weight of the material on the previous machines, the weight on the back divided by the draft gave the weight on the front, but in dealing with hanks, as the weight decreases as the number increases, the reverse is true and the hank on the back multiplied by the draft will give the hank on the front. On the intermediate and fine frames, where there are two ends doubled in the creel to be drawn and combined into one end on the front, the size of the single roving in the creel must be divided by two. For illustration, two ends of 2 H. R. doubled in the creel is the equivalent in size and weight of one end of 1 H. R. and should be so treated, also 5 H. R. doubled in the creel is the equivalent of a single 2.5 H. R.

From the above we get the following rules. Rule to find the H. R. a frame is delivering when the draft and H. R. in the creel are known:

H. R. in creel $\times$ *draft* $\div 2 =$ *H. R. on front.*

Example: The H. R. in creel is 1.5 doubled; draft of machine is 5; what is the H. R. on the front?

$$\frac{1.5 \times 5}{2} = 3.75 \text{ H. R. on front.}$$

Rule to find the draft when the H. R. on front and in the creel are known:

H. R. on front $\times 2 \div$ *H. R. in creel = draft.*

Example: The H. R. being delivered on front is 15, with 5 H. R. doubled in the creel; what is the draft?

$$\frac{15 \times 2}{5} = 6 \text{ draft.}$$

Rule to find the H. R. in the creel, the draft of the machine and the H. R. on front being known:

H. R. on front $\times 2 \div$ *draft = H. R. in the creel.*

Example: If the H. R. on the front is 10 and the draft is 5, what is the size of the single roving in the creel?

$$\frac{10 \times 2}{5} = 4 \text{ H. R. in the creel.}$$

The following problem worked out, first, by the hanks, and, second, by the weight of the material, will illustrate clearly both methods and serve to show that either one is correct.

Example: What size roving is being made if the sliver on the back of the slubber weighs 42 grains per yard? The slubber has a draft of 4, the intermediate a draft of 5, and the fine frame a draft of 6, with roving doubled in the creels of the intermediate and fine frames.

(1). $8.33 \div 42 = .198$.

$$\frac{.198 \times 4 \times 5 \times 6}{2 \times 2} = 5.95 \text{ H. R.}$$

(2). $$\frac{42 \times 2 \times 2}{4 \times 5 \times 6} = 1.4.$$

$8.33 \div 1.4 = 5.95$ H. R.

In working the above example, the first method was to reduce the 42 grain sliver, on the back of the slubber, to .198 hank sliver, by dividing 8.33 by 42, and then multiply this .198 by the drafts on the three fly frames and divide by the doublings on the intermediate and fine frames. In the second method illustrated, the weight of the sliver on the back of the slubber was divided by the drafts of the three frames and multiplied by the doublings on the intermediate and fine frames. This gives the weight, in grains per yard, of the fine roving, and 8.33 divided by this weight gives the size of the roving.

(To be Continued.)

CHEMISTRY AND THE TEXTILE INDUSTRIES.

In a public lecture before the American Chemical Society on "The Earning Power of Chemistry," Arthur D. Little of Boston, gave some striking instances of what chemistry has done for the advance of the textile industries.

Many of the most brilliant achievements of chemistry, he said, have been directly concerned with the textile industries. A little touch of chemistry to cotton yarns and fabrics in the mercerizing process gave the world what is practically a new textile fibre—cotton with the beauty and lustre of silk. A history of absorbing interest replete with struggle, the capture of positions of temporary advantage, the constant shifting of the fighting line, crushing defeats and signal victories, might be written of the development of the bleach and alkali industry, upon the products of which the textile manufacturer depends for the finishing of his goods. We see the pathetic figure of Le Blanc dying in the poorhouse after enriching the world which Napoleon was devastating. No less interesting in its human and scientific aspects is the long story of the coal-tar colors in which chemists take so large a measure of justifiable pride. An investment of $750,000,000 follows Perkin's discovery of mauve.

Less notable, but nevertheless an industrial achievement of the highest order is the very modern development of artificial silk which, though made from wood pulp, far surpasses in brilliance and beauty, the finest product of China and Japan. Closely related thereto is the artificial horse hair of which so large a proportion of women's hats are made and the still more recent artificial bristles of cellulose acetate with which you may have brushed your hair this morning.

The British legation at Buenos Aires reports that the first shipment of raw cotton from Argentina was recently made, when 200 tons of cotton grown in the Chaco were exported to Spain. According to the industrial census of 1910 about 4,340 acres of land in Argentina are devoted to cotton cultivation, which is at present only in the experimental stage.

A Russian business house informs an American consulate that it desires to correspond with American firms manufacturing raw cotton threads of various colors and grades in the hank, the intention being to spool in Russia. Correspondence may be in English. Samples would also be appreciated. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file No. 7296.

NEW CHEMICALS FOR TEXTILE YARNS.

Drs. Stark and Noll, electro-chemical experts, with offices at The Hague and connections in Amsterdam, are the authors of an invention promising to have a great influence upon the textile industries of this district, now of considerable and growing importance, by largely increasing their output.

As described by its authors, the invention consists of certain chemical mixtures for strengthening and otherwise improving the threads and similar materials used in the production of cotton, woolen, linen, and silk fabrics. By an oxidizing process, changes are caused in the chemical composition of a certain gum. A liquid solution results, which is readily absorbed by the threads or other tissue to which it is applied. The material thus treated is made supple, smooth, and of the required firmness. The treatment strengthens brittle materials which otherwise would break easily, and thus they will go smoothly and safely through the loom. It is stated that experiments demonstrate that this device will augment production five per cent, without increasing labor or machinery. The application of the gummy solution, it is explained, will dispense with grease or other substances ordinarily used, and thus affect another economy in production.

In the form in which the preparation is packed for export, it is perfectly dry and will not absorb moisture from the air. It is of a constantly equable composition. Its application, we are assured, will not affect colors unless to make them more pronounced. As it does not attract moisture, the material with which it is treated does not become flabby, and stains are impossible.

The invention contemplates seven varieties of the preparation, described as follows:

1. Textile gum A, for dressing or smoothing all kinds of tissues, such as cotton, wool, and silk.
2. Textile gum NBA, for sizing cotton thread.
3. Textile gum NB, to increase the weight of cotton thread. This has such a strong adhesive quality that the weight is increased 100 per cent, while the thread is kept soft and flexible. If desired, the weight may be increased 180 per cent in the subsequent dressing of the tissue.
4. Textile gum SN, for sizing woolen thread.
5. Textile gum TW, a substitute for glue or sizing ordinarily applied to woolen thread.
6. Textile gum TG, for wool or half wool in cloth manufacturing.
7. Java gum, to thicken the colors for cotton and woolen printing.

Preparation A can be used to great advantage in the manufacture of pasteboard tubes for spinning mills.

It is stated that in ordinary weaving 42 pounds of potato flour with the customary amount of grease mixtures can be advantageously replaced by 10 pounds of this textile gum and 10 pounds of potato flour, without other substances, and that better results and economy in cost will be obtained.

The silk crop of China this season is said to be 20 per cent larger than last year, and while the color is not so good the opinion is general that the quality of the cocoons is slightly better. Prices are somewhat lower. The market for buying silk cocoons opened at Wusieh, China, June 1.

KNITTING

KNITTED CAPS AND TOQUES.

(*Contributed Exclusively to* Cotton)

BY H. K.

With the advent of winter comes the desire for knitted garments for outdoor wear. Knitted specialties are increasing in demand more and more as each season comes round and knitting manufacturers have brought their ingenuity and enterprise to bear on the prevailing fashion. Several years ago the coat sweater was introduced and has now been so perfected that it has become a standard garment. Following the coat sweater came the muffler which

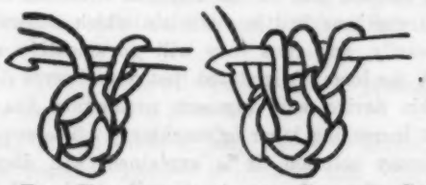


Fig. 1. The Formation of the Crochet Stitch.

has also had a very successful career. Its popularity still increases and the demand becomes greater and greater. Machine builders have built special machines for this trade so that three and four mufflers can be made at one time on a fully automatic machine.

Last fall saw the innovation of the "aviation cap." One yarn manufacturer in advertising yarns for this cap said, "It has taken America by storm." With the sale of the yarn, each purchaser received the instructions how to

Fig. 2. A Type of Aviation Cap.

make one of these caps. In a very short time they were right in the forefront of popular fashion. They were made by hand with a crochet hook. A girl skilled in the art of crochet can make one of these caps in about two and a half hours. There were two styles of yarns used; the first yarn was practically a roving, containing very little twist and very soft. The tendency for a cap made from this yarn was that when washed it stretched beyond the original size. The other yarn used was a plyed yarn. When using three strands of this and using them as one, a very serviceable cap was produced. This yarn being similar to a regular knitting yarn. This season the demand for this type of cap has increased. The price is now so reasonable that they are well within the reach of all.

An illustration of the formation of this crochet stitch is shown in Fig. 1. Many machine knitted caps are now

Fig. 3. A Machine-Knitted Cap from Angora Wool.

made and sold, the general run of them being made in close imitation to the hand product. These caps are warp knit, a system of knitting which resembles crochet more closely than any other style of machine knitting. Many knitted caps are made oin circular machines of nine inch and ten inch diameter, which automatically changes the stitch from half cardigan to plain rib. The fabric being produced in long lengths and afterwards cut up into lengths suitable for caps, one end of the cap being doubled inside the other and the ends drawn together on the inside. The top of the cap is finished off with a tassel of the yarn or a button of the knit fabric. Pine-apple stitch is another stitch used for caps and toques. The making of this stitch requires a special machine. The dial cams on this machine are so constructed that two lengths of dial needles are

used. The needles are aranged to knit and tuck at certain feeds. The cams are controlled automatically. The machine is a six-feed and this allows different colored yarns to be knitted into very attractive designs and colorings.

In Fig. 2 is shown one of the "aviation caps" which are being worn this fall. The majority of the caps shown in the stores have a colored band with a white crown. The band may be striped, or the white worked in on the colored band in a shell formation which gives the cap a very attractive appearance. The stitch used in these caps is simple and that factor alone will increase its popularity. Varieties of the stitch can be made and the various combinations of color is worked in to suit, according to the originality and artistic sense of the crochet worker. Many of these caps are finished off with a silver buckle or feather and the addition of these add to the smart appearance of the cap. The cap will retain its shape much longer if it is lined with silk or sateen.

The illustration at Fig. 3 shows a machine knitted cap made from Angora wool. It is only recently that this cap has been shown. The fabric is similar to that found in the familiar tam-o-shanter. It has an advantage over the crochet cap, in that it will hold its shape much longer. It is made in a firmer stitch and for warmth it will excell the other.

For lady autoists we see the introduction this fall of automobile hoods. One type of this cap is illustrated at Fig. 4.

FIG. 4. A TYPE OF AUTOMOBILE HOOD.

It is made in mercerized cotton, fibre silk and spun silk, and wool. All of the latest fashionable colors can be had in this hood. Such colors as cream, pearl gray, champagne, Copenhagen blue, king blue and other familiar colors. From the illustration this hood resembles a scarf in appearance and buttons with dome fasteners in the front. A narrow tie is arranged at the neck so that the hood will bite close around the throat. Another hood similar to this is being shown and it has some admirable features over the one illustrated. This hood, fitting the head somewhat tightly, prevents the cold air from getting into the inner side of

FIG. 5. A BOY'S CAP FOR OUTDOOR SPORTS.

the cap. For automobiling it will come as a great boon and be convenient and comfortable for the feminine autoist. It is dainty, warm and durable and ere long will be in vogue all over the land.

In Fig. 5 is shown a boy's skating cap which is worn by young men and boys, for skating and outdoor sports. These caps are made in all the popular colors or a combination of two colors where the band is of one color and the crown of another. This style of cap is made on a Lamb flat machine having automatic tubular cams.

In the manufacture of caps and hoods there is a field for originality and creativeness on the part of manufacturers. The illustrations given show some of the more popular lines of these goods.

The investigation into possible sources of potash salts in the United States is being made this year by the United States Geological Survey under an appropriation by Congress of $20,000 for the current year. One of the possible sources from which potash may be derived is in association with saline deposits left by the drying up of large bodies of salty waters, such as are known to have existed at one time in many of the now desert areas of southwest Oregon, Nevada, southeast California, Utah, and elsewhere. It is hoped that by testing these saline deposits some may be found sufficiently rich in potash to have a commercial value, and that there may even be located some large and important deposits.

DYEING, BLEACHING AND FINISHING.

THE ELECTROLYTIC METHOD OF BLEACHING.

BY BLEACHER.

EDITOR COTTON:

I would ask the following questions through the columns of your interesting journal and will greatly appreciate answers from some of your correspondents who are familiar with this subject of electrolytic bleaching preparations:

First. At what strength it is best to keep the bleaching liquor for bleaching warps, say 2/40's to 2/70's Sea Island yarn?

Second. What is the correct method of testing the strength of this bleach liquor?

Third. Is there a table already prepared which I can get, or can one of your correspondents, prepare for the readers of COTTON a table, to indicate the strength after testing so as to do away with all the figuring required after an iodide of potassium test?

ANSWERS TO BLEACHING QUESTIONS.

(*Contributed Exclusively to* COTTON.)

BY J. MERRITT MATTHEWS, PH. D.

EDITOR COTTON:

Replying to the queries regarding the electrolytic method of bleaching cotton, I wish to submit the following answers.

Question 1. What strength is it best to keep the liquor for bleaching warps of 2/40's-2/70's Sea Island yarn?

Answer. Warps are generally bleached at the present time in the open vat system, that is to say, the warps after being boiled out are folded down in a wooden or cement-lined tank into the bleach liquor. When the complete charge of yarn is placed in the tank, the bleach liquor should cover completely the cotton. The warps are steeped in this manner for from 20 minutes to a half hour. Then the bleach liquor is drawn off at the bottom into a cistern located below the tank, after which it is pumped up into the tank again over the warps until the liquor again submerges the yarn. This operation is repeated two or three times to obtain the satisfactory degree of bleach.

For an electrolytically prepared bleaching solution the strength should be of about two grams of available chlorine per liter, which corresponds to a chlorine strength of two-tenths of one per cent. This in turn is equivalent to about ¼ ounce of chlorine per gallon. Weaker solutions than this may be employed but it will take a longer time to effect the proper degree of bleaching and there will be danger of the fiber being incompletely bleached, so that the yellowish-brown color of the cotton is liable to re-appear after the goods have gone out on the market. If the warps are bleached on the open run, that is to say, where they are run through the bleaching liquor continuously, then through squeeze rolls and folded down in boxes or bins so that they are exposed to the action of the air and the bleach liquor for several hours, it is recommended to use about the same strength of bleach liquor. If the time of ageing is lessened, it will be necessary to use stronger liquors than those testing to two grams per litre of chlorine. More than this amount is not to be recommended in the case of fine Sea Island yarn, as the stronger bleach liquors are liable to cause a deterioration in the lustre and strength of the fibre and also to yield a harsher finish on the bleached warp.

On the other hand, if more dilute liquors are employed for the bleaching, the time of ageing will have to be extended and this is also somewhat undesirable, for in the first place it will materially cut down the production in the bleach house and it also has a bad effect on the yarn, for when cotton which is saturated with bleaching solution is exposed to contact with the air, there is always a formation of oxycellulose, and if the time of this action is sufficient, there may be enough of this oxycellulose formed to cause defects in the fiber after the bleaching operation. These defects are chiefly evidenced by the cotton becoming tender and turning yellow after the lapse of time which in some cases is several months.

Question 2. What is the correct method of testing the strength of the electrolytic bleach liquor?

Answer. Since the electrolytic bleach liquor is prepared by the action of an electric current on a solution of common salt, and since there is present in the solution a large excess of salt in addition to that which is decomposed by the current to form sodium hypochlorite, it is impossible to determine the bleaching, or chlorometric strength of the solution by means of the ordinary method of twaddling.

The salt solution before the passage of the electric current will show practically the same twaddle test as the same solution after electrolysis. Since the bleaching efficiency of these electrolytic liquors is due to the amount of sodium hypochlorite produced in them, the only practical method of determining their bleaching strength is one in which the amount of sodium hypochlorite is ascertained. This method is the ordinary one of determining the amount of so-called "available" chlorine, as it is this available chlorine which brings about the action of bleaching. The best method of making this determination is by means of a titration test using a solution of sodium arsenite. The method in brief outline is as follows:

Ten cubic centimeters of the bleach liquor are placed in a small porcelain dish and a tenth normal solution of sodium arsenite is added thereto with constant stirring until a drop of the liquor placed on a piece of filter paper, which has been saturated with a mixed solution of potassium iodide and starch, no longer shows a blue coloration. Every cubic centimeter of the tenth normal arsenite solution required will represent 0.355 grams of available chlorine per liter in the bleaching solution. To carry out this test with any degree of accuracy requires, of course, an accurately prepared and standardized tenth normal solution of sodium arsenite and it also requires suitable chemical apparatus, such as a burette, graduated in 1/10 cubic centimeters, and accurately standardized and graduated pipettes for the purpose of measuring out the solution to be titrated. It also requires considerable accuracy in handling the test to insure proper results and any person who

has not had training in chemical analysis should be shown how to do this test by a chemist before attempting it himself.

There is no method which can be used by the practical bleacher in the mill for the purpose of getting at the correct strength of the electrolytic bleach liquor, without the use of chemical apparatus and the knowledge of considerable chemical manipulation. This unfortunately, is one of the chief draw-backs to the successful use of electrolytic liquors in bleaching, and owing to the fact that the bleacher does not know the exact strength of his liquors, there are frequently serious faults developing in the practical application of electrolytically prepared bleach liquors.

The method of testing a bleach liquor with a solution of iodide of potassium and starch, or with a paper which has been prepared by saturating it with the mixed solutions of potassium iodide and starch, does not give in any manner at all the strength of the solution. It merely indicates qualitatively the presence in the liquor of available chlorine and as this test is a very delicate one for chlorine, it will show very small quantities or even traces of chlorine, and bleaching liquors which might show very distinctly the blue coloration with potassium iodide and starch, might be so weak that they would practically be incapable of bleaching the cotton at all.

Though sodium hypochlorite is undoubtedly more desirable for use as a bleaching agent than chloride of lime solution, the method of preparing it by means of electrolyzing the solution of common salt does not seem to be as satisfactory, as far as practical purposes of bleaching are concerned, as a corresponding solution of sodium hypochlorite prepared by the use of liquid chlorine. This latter solution is best prepared by the action of liquid chlorine on a solution of soda ash. As far as its bleaching action and efficiency is concerned, it gives the same results as a solution of electrolytically prepared sodium hypochlorite containing the same proportion of available chlorine, and since the quantity of liquid chlorine used for the preparation of the solution may be very accurately weighed out, the bleacher can use such a solution in the same manner as he has formerly used his chloride of lime liquors, that is to say, he can determine their bleaching strength directly by the use of the twaddle hydrometer. Owing to this fact the liquid chlorine method of preparing the sodium hypochlorite solution is much more practical in its application than the electrolytic method.

It is admitted that Sakellarides cotton is the finest of all Egyptian varieties. Mr. Sakellarides, who discovered it, has so far made $500,000 by his enterprise. It has been cultivated on a large scale this year in the districts of Zifta and Santa. It seems to be immune to the attacks of the cotton worm. The fight against the cotton worm this year has cost the Egyptian government nearly $250,000 and private individuals about $500,000. These sacrifices, however, are insignificant in comparison with the value of the crop, which may be estimated at $150,000,000.

The Hongkong cotton market is almost at a standstill at present owing to the interference with the market's former trade growing out of the watered cotton abuses in the Yangtze valley. It is expected that as a result of the strenuous campaign against this in the north there may be a considerable movement of Indian cotton during the latter portion of the season.

STRENGTH OF LIQUOR IN ELECTROLYTIC BLEACHING.

(*Contributed Exclusively to* COTTON.)

BY P. MCD., CHEMICAL ENGINEER.

The question often arises as to the proper strength of bleach required for some certain grade or kind of cotton. No set rule can be laid down for this, and very little information can be given. It is exceedingly difficult to find two mills handling practically the same class of goods, who use the same strength of bleaching liquor. Therefore, one must look farther than the kind or grade of cotton.

There are quite a number of conditions that will affect the strength of bleach required for any given grade or kind of cotton, such as the boil off; thoroughness of rinsing before bleaching; the temperature of the bleach bath; the time desired for the goods to remain in the bath; and the method of handling the goods.

The most important of these is the boil off. It is very decidedly false economy to shorten this part of the bleaching process. Unless the cotton is properly degummed it is impossible to get results as they should be. The application of the bleach itself is as a trifle compared to this. There is an instance where two mills using the same make of kier, water from the same source, same class of goods, and where one bleached one thousand pounds of goods with 100 gallons of electrolytic bleach, the other was compelled to use 240 gallons. The one mill used bleach of such low strength that it was impossible to read it on the Twaddle glass, while the other used it at 3 degrees. The goods from the one mill was softer and had greater strength than the other. The first mill boiled the goods ten hours, and the latter five hours.

Another case of where two mills had conditions as the above, were using chloride of lime. The one mill used 30 pounds of chloride of lime per thousand pounds of goods and the other used over 200 pounds per thousand. The one mill used no softeners after bleaching, while the latter were compelled to use four per cent of the weight of the goods. The strengths of the baths in this case were respectively ½ degree and three degrees Twaddle. The first of these mills boiled the goods all night, and the other about three hours.

In another case, a bleaching company was at times compelled to use a bleach bath of three degrees Twaddle in order to get the goods white in a given length of time. They have since taken on a new superintendent who lengthened the time of the boil off and cut the bleach strength to ½ degree Twaddle.

After boiling off, if the chemicals used are not thoroughly rinsed out they will retard the action of the bleach to such an extent that a much stronger solution will be required. During the summer of 1909 there was such a drought in Eastern Pennsylvania that many of the mills suffered a water shortage. One job bleacher during this time, shortened the rinsing between the boiling off and the bleaching in order to get sufficient water for the other processes connected with the bleaching, and as a result, found that it required twice as much bleach, and twice the strength in the bleach bath, as it did before and after he obtained sufficient water for his plant.

If the goods are to be bleached in a given length of time, the strength of the bleach required will be inversely

proportional to the temperature of the bleaching bath. It requires about 25 per cent stronger liquor at 60 degrees Fahrenheit than at 90 degrees.

If all other conditions are the same, it will require a much stronger bleach solution to obtain a certain degree of whiteness in one hour than it will in two hours. One hosiery mill bleaching with electrolytic bleach use 1/10 gram of chlorine per litre, leaving the goods in four hours. If they desire to bleach in one hour they must use ½ gram strength.

It requires a greater chlorine strength to bleach where the goods are simply saturated with bleach liquor and piled, than it does when the bleach is kept circulating through the goods, or the goods through the bleach. This is due to the small volume of liquor used in the former case.

Even if the goods are properly prepared before bleaching, it will, of course, require a greater degree of strength in the bleach for Egyptian than it will for Sea Island yarn, and greater strength for Sea Island than for combed peeler, due to the greater amount of natural coloring in the cotton. The only way to determine these strengths exactly is for each mill to experiment and find their own individual needs. This should not exceed two grams of chlorine per litre, or 1½ degrees Twaddle.

The method of determining the strength and amount of the bleach varies. A fairly close method is the specific gravity, determined by the means of a Baume or a Twaddle hydrometer. Where a new bath is made up for each and every lot of goods, this method is a very good one for the electrolytic bleach, but is worthless on standing bath solutions. This is due to the fact that the compounds formed through the bleaching reactions are soluble and therefore, are not taken from the bath. Consequently, the bleach will have, before and after being used, approximately the same specific gravity. Therefore, a different method must be employed. The cusomary one, when the goods are drawn through the bleach, thus becoming saturated, and then piled, is to allow the bleach to flow into the bleaching bath at a constant rate, determined by experiment. Since the goods also are passing through at a constant rate this is a very accurate method to employ, much more so than the one sometimes used on chloride of lime solutions when from time to time bleach is added. For in the former case the strength and the volume is kept constant while in the latter there is a maximum and minimum point, so that there is danger of overbleaching at one point and underbleaching at the other.

Where the goods are left in the bleach during the entire process and the bleach is forced through by means of a pump or the reverse, the goods drawn around through the bleach, the method sometimes employed is to add a definite volume of bleach for a definite weight of goods of one grade. This method is more accurate than it may at first appear, for in manufacturing the bleaching liquors, if care is exercised in having the brine of constant strength, it will, upon entering the cells, carry the same current of electricity, which, according to a certain law, will release no more and no less chlorine from the brine. It is imposible for it to do otherwise. Therefore, the bleach liquor will be of constant strength. The same kind of goods, when handled and treated in the same manner, will require almost identically the same amount of bleach. Thus it can be readily seen that to determine the amount of bleach required becomes a very simple matter. As a check on this, or to determine exactly the chlorine content of electrolytic bleaching liquor, it is necessary to make an actual analysis by means of either arsenious acid, or sodium thiosulphate solutions.

The former method is as follows:

Into a beaker a measured amount of the bleach liquor is placed, usually 10 cubic centimeters. Tenth normal arsenious acid is then run into this from a burette until a drop of the mixture no longer produces a discoloration upon paper saturated with potassium iodide and starch. The number of cubic centimeters of arsenious acid used multiplied by the factor 3.545, divided by the number of cubic centimeters of bleach used as a sample, gives the chlorine content in grams per litre.

Burette Reading	Tenths of Cubic Centimeters.									
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0.	0	.035	.071	.106	.142	.177	.213	.248	.284	.319
1.	.355	.390	.425	.461	.496	.532	.567	.603	.638	.674
2.	.709	.744	.780	.815	.851	.886	.922	.957	.993	1.029
3.	1.064	1.099	1.134	1.170	1.205	1.241	1.276	1.312	1.347	1.383
4.	1.418	1.453	1.489	1.524	1.560	1.595	1.631	1.666	1.701	1.737
5.	1.772	1.807	1.843	1.879	1.914	1.950	1.985	2.021	2.056	2.091
6.	2.127	2.162	2.198	2.233	2.269	2.304	2.340	2.375	2.411	2.446
7.	2.482	2.517	2.552	2.588	2.623	2.659	2.694	2.730	2.765	2.801
8.	2.836	2.871	2.907	2.942	2.978	3.013	3.049	3.084	3.120	3.155
9.	3.191	3.226	3.261	3.297	3.332	3.368	3.403	3.439	3.474	3.510
10.	3.545	3.580	3.616	3.651	3.687	3.722	3.758	3.793	3.828	3.864
11.	3.900	3.935	3.970	4.006	4.041	4.077	4.112	4.148	4.183	4.219
12.	4.254	4.289	4.325	4.360	4.396	4.431	4.467	4.502	4.538	4.573
13.	4.608	4.644	4.679	4.715	4.750	4.786	4.821	4.857	4.892	4.928
14.	4.963	5.098	5.054	5.069	5.105	5.140	5.176	5.211	5.247	5.282
15.	5.318	5.353	5.388	5.424	5.459	5.495	5.530	5.566	5.601	5.647
16.	5.672	5.707	5.743	5.778	5.814	5.849	5.885	5.920	5.956	5.991
17.	6.027	6.062	6.097	6.133	6.168	6.204	6.239	6.275	6.309	6.346
18.	6.381	6.416	6.452	6.487	6.523	6.558	6.594	6.629	6.665	6.700
19.	6.736	6.772	6.806	6.842	6.877	6.913	6.948	6.984	7.019	7.054
20.	7.090					7.27				7.409

Chart for Determining the Chlorine Strength of Sodium Hypochlorite.

The thiosulphate method is as follows:

Into a beaker is placed 10 cubic centimeters of bleach solution. This is diluted to about 100 cubic centimeters and 10 cubic centimeters of 10 per cent potassium iodide solution is added. The solution is then acidified with acetic acid, and a few drops of the starch solution added. Into this mixture tenth normal sodium thiosulphate is then run until the color disappears.

The accompanying table may be of some assistance in determining the chlorine content of bleach liquors by either of the methods where 10 cubic centimeters of bleach is used as a sample.

The first vertical column is the number of cubic centimeters of tenth normal arsenious acid or thiosulphate used and the first horizontal column tenths of cubic centimeters. As an example—if 11.7 cubic centimeters of arsenious acid were used, the number at which the horizontal column opposite 11, and the vertical column under .7 crosses, represents the chlorine content in grams per litre, and is found to be 4.15.

THE EFFECT OF BLEACHING AND MERCERIZING ON COTTON YARNS.

Contributed Exclusively to Cotton

BY J. MERRITT MATTHEWS, PH. D.

At the Manchester School of Technology, Manchester, England, Prof. Hubner has recently made a detailed study of the effects on the physcial properties of cotton yarns by the usual processes of bleaching and mercerizing. The yarn employed for the tests was 34/2 from Lagos, and probably of a grade corresponding to American Peeler. The following tabulation represents the results obtained in the tests; each figure being a mean of four individual tests on separate skeins of yarn:

	Grey	1	2	3	4	5	6	7	8	9	10	11
Loss in weight, per cent	0	5.5	4.6	3.0	3.0	3.1	5.0	4.9	4.9	3.4	3.4	3.4
Loss in length, per cent	0	2.0	1.0	0.4	1.1	1.1	2.0	1.7	2.0	0.2	0.6	0.1(gain)
Mean count	16.5	17.7	17.4	17.4	17.0	17.0	17.4	17.5	17.4	17.6	17.2	17.4
Mean Lea break in pounds	97.0	72.4	82.2	86.4	87.1	85.9	77.7	80.0	79.8	80.3	80.5	78.3
Double thread in ounces	27.7	23.3	26.1	27.6	28.1	27.6	24.1	23.9	23.7	26.5	26.1	25.9
Double thread stretch in 1/16 inches	20.6	14.2	11.1	10.3	11.1	10.8	13.8	14.0	13.8	9.1	9.2	8.9
Turns per inch twist	20.2	19.9	19.6	20.0	20.2	20.3	20.1	20.1	19.9	19.9	19.3	19.6
Moisture as per cent regain	5.9	5.1	7.2	7.3	7.6	7.6	5.3	5.5	5.4	7.6	7.7	8.2

Column one represents the yarn which was *boiled* for six hours without pressure in a five per cent solution of caustic soda, calculated on the weight of the yarn. After which the skeins were washed, neutralized with hydro-chloric acid at one degree Tw., and again washed and dried.

Column two represents yarn which was *boiled* as in example one, then *mercerized* under tension in caustic soda of 60 degrees Tw., soured, washed and dried.

Column three represents yarn which was *boiled* as in example one, then *mercerized* as in example two, and finally *bleached in chloride of lime* containing 1.8 grams of available chlorine per litre for two hours, then soured, washed and dried.

Column four represents yarn treated in the same manner as column three, except that the bleaching was done with a solution of *sodium hypochlorite* containing 1.8 grams of available chlorine per litre.

Column five represents yarn treated in the same manner as column three, except the bleaching was done with an *electrolytic bleach liquor* containing 1.8 grams of available chlorine per litre.

Column six represents yarn which was *boiled* as in example one, and then *bleached* as in column three.

Column seven represents yarn treated in the same manner as in column six, but bleached as in column four.

Column eight represents yarn treated in the same manner as in column six, but bleached as in column five.

Column nine represents yarn treated in the same manner as in column six, but afterwards mercerized as in column two.

Column ten represents yarn treated in the same manner as in column seven, but afterwards mercerized as in column two.

Column eleven represents yarn treated in the same manner as in column eight, but afterwards mercerized as in column two.

A study of these results shows a number of discrepancies; for example, the yarn gives a loss in weight of 5.5 per cent, on simply boiling out. This is as would be expected and is a normal figure. But the same yarn after boiling out is then mercerized, and the loss in weight is only 4.6 per cent. In other words, the process of mercerizing has increased the weight of the boiled-out yarn by 0.9 per cent. We do not think that general practice indicates any such increase as this, but on the contrary, shows a small further loss in weight due to the mercerizing action.

This yarn which has been boiled out and mercerized, is then bleached, and at this stage shows a loss in weight of only 3.0 per cent. That is to say, the bleaching of the mercerized yarn has added 1.6 per cent in weight, or a total increase in weight of 2.5 per cent over the boiled-out yarn. While the apparent increase in weight due to the mercerizing may be caused by the increased amount of moisture in the mercerized yarn beyond that held by the boiled-out yarn which is 7.2 per cent against 5.1 per cent, yet this considerable increase in weight caused by the bleaching is utterly beyond comprehension, for the moisture content of the bleached and mercerized yarn is only slightly greater than that of the mercerized yarn. The same incomprehensible results are obtained with the yarn which was simply boiled out and bleached; in every case there is an increase in weight produced by the bleaching process. These results are utterly at variance with general mill practice, as the bleaching operation always produces a loss in weight.

Again, with regard to the tensile strength; the boiled-out yarn shows a loss in strength of 25 per cent, from the grey yarn. Such a condition would show a very poor method of boiling out, and one which could not be followed in practice. The mercerizing, it is true, increases the tensile strength of the boiled-out yarn, but even after mercerizing, the yarn is still 15 per cent weaker than the

grey yarn. As a matter of fact, properly mercerized yarn should show an increase in tensile strength over the grey yarn of 25 to 50 per cent. But as we go still further with these figures of Mr. Hubner's, we find that the bleaching of the mercerized yarn increases its strength by quite an appreciable amount (about 6 per cent); this is also a result at variance with practice. On examining the results obtained on plain bleached yarns, we find that the yarns boiled out and bleached by Mr. Hubner show a loss of about 20 per cent in strength from the grey yarns as shown in columns six, seven and eight. This is altogether wrong, for in practice, a well-bleached two-ply yarn should show no loss in strength at all, or at most not more than 5 per cent.

The results of Prof. Hubner's experiments are so inconsistent with those obtained in ordinary every-day mill practice, that we are forced to the conclusion that the procedure under which his tests were conducted were not in accordance with the approved conditions of actual work. As a consequence, the results obtained in these experiments are erroneous and untrustworthy. They represent in an entirely false manner the actual effects produced in cotton yarns by the operations in question.

MONOPOLE OIL.

BY J. MERRITT MATTHEWS, PH. D.

The general class of soluble oils, including turkey red oils, olein oils, and various articles of this same character marketed under proprietary names, have long held an established position in the textile industries. They find a large use in printing, dyeing and finishing, especially in relation to cotton and silk.

Probably the most decided advance which has been made in the manufacture of oils of this general character is that accomplished by Dr. A. Schmitz, of Heerdt, Germany, in the preparation of certain products known as Monopole oils. These have come into wide use of late years, and are especially desirable for a considerable range of application. While they have the same general properties of soluble oils as a class, they possess additional characteristics which much enhance their value for use in various branches of the textile industry.

As is well known, turkey red oil in its strict meaning, is a product obtained by sulphonation of castor oil. By this is meant that the castor oil, (which like other vegetable oils is totally insoluble in water), is acted upon by strong sulphuric acid, with which it combines to yield a definite compound. This product is then freed from excess of acid by proper washing, or treatment with alkali until the product is of a neutral character.

In the manufacture of Monopole oil, however, further operations are carried on which serve to sharply differentiate this product from turkey red oil. The sulphonated oil, after being freed from excess of acid, is boiled for a long time with water, which has the effect of decomposing the sulphuric acid compound of the oil in such a manner that the acid is completely disengaged and a fatty oxy-acid compound of the oil is obtained. This latter is completely insoluble in water. This compound is then mixed with a further quantity of castor oil, with which it is heated for some time. It is then allowed to cool, and is again sulphonated with sulphuric acid in the usual manner, after which it is washed with water or alkaline water in order to remove all excess of acid, and the result is that a neutral soluble oil is obtained which contains a high percentage of fats.

There are several features of Monopole oil which strongly recommend it as advantageous over turkey red oils, olein oils, etc. In the first place, it has a relatively high percentage of fats. Turkey red oils and other soluble oils usually contain from 30 to 50 per cent of fats, depending upon the purity and value of the product, whereas Monopole oil contains 50 to 75 per cent of fats. Another advantage of this oil is its great solubility in water. It is not only soluble in warm or hot water, but is furthermore readily and completely soluble in cold water.

The distinguishing characteristic, however, which gives a value to Monopole oil over all other soluble oils is the fact that it does not form a precipitate with lime in calcareous water. This property permits of the use of Monopole oil for purposes to which turkey red oils and other soluble oils would not be suitable. For purposes of machine dyeing, such as the dyeing of cops, cheeses, etc., the use of Monopole oil is almost indispensable in order to obtain even and thoroughly penetrated dyeings. Owing to the fact the Monopole oil is not of a resinous or sticky nature, the yarn after dyeing is soft and lustrous with an agreeable handle. The fault of many oils in this connection is that the yarn after dyeing retains a sticky feel, due without doubt to the insoluble lime soaps which filter into the fiber. A number of turkey red oils and other cheaper soluble oils are characterised by a strong odor, the residue of which is always to be detected in yarns which have been treated with such oils. Monopole oil is remarkably free from odor of any kind.

For the usual dyeing of direct colors on cotton materials, Monopole oil is an invaluable adjunct. It may be added to the dyebath directly as the presence of the dyestuff and other materials which may be employed as accessories to the dyebath, such as glaubersalt, phosphate of soda, borax, soap, soda, etc., have no effect on the oil. The use of the Monopole oil in this connection causes the cotton to be very quickly and evenly wet-out even when the dye liquor is comparatively cold. The wetting-out is almost instantaneous when the dye liquor is near the boil. The presence of the oil in the dyebath also causes a much more even distribution of the colors and a very thorough penetration through the fiber. More color is also fixed on the fibre, and the material is left in a clean, soft condition such as cannot be obtained without the use of the oil. The presence of the oil in the dyebath also increases very considerably the lustre of the fiber and the brilliancy of the color. For the production of these effects, it is only necessary to employ a relatively small amount of the oil. The present writer has obtained very excellent results with a proportion of about one pint of the Monopole oil to 100 gallons of dye liquor. This amount is for the starting bath and for succeeding baths only about one-half pint need be added. Not only is the use of Monopole oil advantageous in the dyeing of cotton, but it is equally so in the dyeing of linen, ramie, jute, silk, wool, and artificial silk, union goods and half-silk material.

In the case of silk dyeing, Monopole oil can be used with great advantage for purposes of brightening, taking the place of oil and alkali used for emulsifying. No addition of alkali need be made as this oil does not require to be emulsified, being perfectly soluble.

Turkey red oils, and in fact all soluble oils in general, have the characteristic property of dissolving the pectin matters present in cotton and other vegetable fibers. On this account such oils are extensively employed for the purpose of boiling-out these fibers previous to bleaching. The oil is usually mixed with the alkali employed in boiling-out kier. Monopole oil is especially adapted for this purpose, as it very quickly and completely dissolves the resinous and pectin matters present in the vegetable fibers; it has the added advantage, however, over the ordinary soluble oils in that it does not form insoluble compounds with either the impurities in the cotton or those in the water which is used in the kier. Very often trouble has been experienced in boiling-out cotton or linen for bleaching when soluble oils are used in the kier, sticky insoluble products being formed which are very difficult to remove from the fiber. Monopole oil does not show this defect. It also does not leave any odor in the fiber, which is one of the drawbacks in the use of most turkey red oils.

For the brightening of sulphur blacks dyed on cotton, it is customary to use as an after-treatment, a bath containing soluble oil or an emulsion prepared by boiling a vegetable oil, (such as olive oil), with soda ash or borax. When Monopole oil is used in this connection its lustering and brightening effect is very marked, nor does it leave the cotton in an oily condition, such as is often the case with the ordinary soluble oils, or emulsified oils.

In the operations of finishing and sizing, Monopole oil has an extensive use, its solution in water mixes perfectly with all manner of finishing and sizing ingredients, such as starches, flour, tragacanth, dextrine, the various vegetable gums, glue, etc. It is said to be about twice as efficient as the ordinary finishing oils, that is to say, only one-half as much of Monopole oil need be employed. The oil, of course, is added to the finishing and sizing pastes for the purpose of giving smoothness, softness, and brightness to the cloth. The odorless quality of Monopole oil is especially advantageous in this connection.

As an adjunct to the mercerizing of cotton yarns and piece goods, this oil is of very great value. As is well known, in mercerizing it is highly desirable to obtain the cotton in a very absorbent condition before it is treated with the mercerizing lye, which is a highly concentrated solution of caustic soda. If the cotton is first wetted-out by boiling in a solution of Monopole oil previous to the treatment with the caustic alkali, it will be found to absorb the mercerizing liquor much more rapidly and thoroughly than when boiled out by the usual processes. It can also be employed for the finishing of mercerized goods to alleviate the harshness which the fibre requires in the mercerizing process.

Another advantageous use for Monopole oil is in the bleaching of fine cottons or mixed wool and cotton goods with peroxide baths containing either hydrogen peroxide or sodium peroxide. A small amount of the oil is added directly to the bleaching bath, and as it is perfectly soluble in the cold or slightly warmed liquor and is not precipitated by the ingredients therein, nor by the hardness which may exist in the water, it has an efficiency which can hardly be attained by turkey red or other soluble oils. Its use in the bleaching baths aids very considerably the penetration of the bleaching liquor, and thus conserves the bleaching activity of the bath to its fullest extent.

The use of Monopole oil in connection with the boiling-off process in the dyeing and bleaching of silk has been found to be very advantageous. As is well known, the boiling-off of silk is for the purpose of removing the silk glue, or sericin from the fiber proper or fibroin. This is usually accomplished by boiling the silk in a strong soap bath and then thoroughly washing. It is really not of advantage, however, to remove all of the silk glue, as if this is done the fine silk fiber becomes liberated and is difficult to handle in the subsequent bleaching and dyeing operations. It has been found that by substituting some of the soap used in the boiling-off with Monopole oil, the boiling-off operation can be so regulated that a small portion of the original silk glue is left on the fiber and thus acts as a protecting layer against the disintegration of the fine silk filaments during bleaching and dyeing. As the inner layer of the silk glue, which is thus left on the fiber is slowly soluble in warm water it is eventually removed in the dying operations, so that when finished the silk is in the same soft condition as if it had been completely boiled-off in the first place; yet the physical condition of the fiber is far more perfect. A practical working formula for the use of Monopole oil in the boiling-off of silk is as follows: 100 gallons of water, 6 pounds of soap, 4 pounds Monopole oil and 7 ounces ammonia 26 degrees Twaddle.

Silk dyers have very largely adopted this method of boiling-off, as the lustre, strength, and scroop of the silk which has been treated in this manner is found to be superior to silk which has been boiled-off in the old manner with the use of soap alone.

Several American exporting firms have recently found it more advantageous and satisfactory to deal directly with South American firms instead of through European branch houses, which has been their policy heretofore.

There may have been a time when quick delivery to most parts of South America could best be secured via Europe; but as regards most of the South American countries quicker delivery can be had to-day from New York than from any European port. This is especially true of Colombia, which has three lines of rapid steamers direct from New York, and Venezuela, also with three, one of which flies the American flag and steams weekly, making delivery of mails and cargo in Venezuela in eight days. This is more than a favorable comparison with the two lines of steamers touching Venezuelan ports, when outward bound, which require from 20 to 24 days from Liverpool to La Guaira.

All of the west coast of South America is nearer New York and New Orleans in point of time than it is to European ports, and present New York facilities for freight to Brazil are almost the equal of those from European ports. At least, it cannot be a hope of saving time that leads American merchants to feel that they must have a European guardian over their South American business. It gives them no cheaper freight rates; in fact, reshipment through London or Hamburg must, naturally, increase the freight and other cost to the consumer, and therefore make more difficult the meeting of European competition. Nothing can be saved on the duties in countries of import or on the expense of embarkation. In fact, there is no manner in which the American manufacturer or his customer in South America gain at all by having a London intermediary between them.

Practical Problems Discussed by Cotton's Readers.

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so indorsed. This department is open to all.

WHAT IS A GOOD PERCENTAGE OF WASTE?

BY X. Y. Z. A.

EDITOR COTTON:

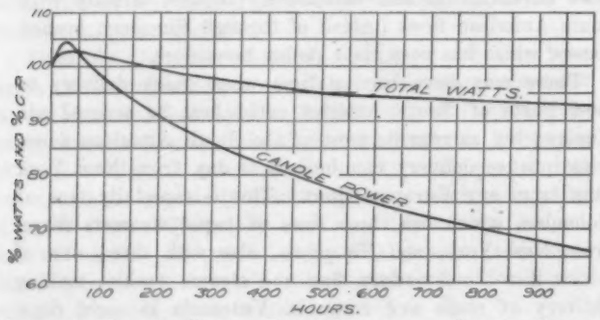
I would like to ask through the columns of your valuable paper what is considered a good percentage of waste from strict middling cotton for the picking and card rooms, making fine hank roving and producing about 4,000 pounds per day.

DISCUSSION ON MILL LIGHTING SYSTEMS

BY E. J. MORA.

EDITOR COTTON:

It is with pleasure that I have read the discussion on Mill Lighting Systems by "Electrical Engineer" in the October number of your valued journal and I beg to submit a few remarks together with a chart of candle power curves of carbon lamps, in an effort to bring out more



AVERAGE CANDLE POWER LIFE CURVE FOR CARBON LAMPS USING 3.1 WATTS PER CANDLE.

forcibly the important points contained in the above mentioned article relative to the candle power and life of carbon lamps.

As stated by "Electrical Engineer," the useful life of carbon lamps is reached when the horizontal candle power has fallen to 80 per cent of its initial or rated value. However the lamp may continue to burn to one thousand or more hours, but the candle power will diminish accordingly and it will be far more economical to replace it with a new lamp before the life has reached the above value, for the reason that the wattage during life remains practically constant and the cost per candle power will therefore increase.

Referring to the candle power curve, it is at once seen that after the lamp has burned 450 hours, the candle power has been reduced 20 per cent, the total wattage however, remaining almost constant, decreasing only about 4 per cent.

By way of illustration, assume a 16 C. P. lamp burning about 1,000hours and consuming 60 watts, the wattage remaining constant throughout its life. Now suppose the cost of burning for the first hour to be X cents and the lamp emmitting its initial candle power, at the 450th hour the cost of burning is still X cents for this hour, but the lamp only emits 80 per cent of its rated candle power or 12.8 C. P.; at the 1,000th hour the cost remains X cents for this particular period, but the candle power has diminished 33 per cent or 10.72 C. P. The cost per candle power, it is seen, increases with the increase in life, because the watts per candle increases.

In most textile mills a certain intensity of illumination is required on the various machines in order that the operators may perform their various duties at the greatest speed and efficiency. Therefore a material reduction in the required illumination at various periods due to lamp deterioration will produce undesirable results. Also, the importance of frequent renewals must not be lost sight of by mill owners.

RAILWAY HEADS IN THE CARD ROOM.

BY MANAGER.

In a former article, during a discussion on the merits of the railway head, and the improved railway head, I made the remark, that I could double card on a 30 inch card, and do a better job than can be done on the revolving flat card, using the old method of railway heads, and with ten cards to the head.

I suppose it is known by all, or nearly all carders and mill managers, that not so very many years ago 30 inch cards were in use to a very great extent, and even some 24 inch cards were in use 30 years ago. That does not seem so very long looking back, but is very long way off, to look ahead. I never had anything to do with a 24 inch card, but I have with a 30 inch card, and for doing a nice job in carding cotton, it was far ahead of the 36 inch, and made a better yarn than any revolving flat card I ever saw. Not that the carding on the revolving flat card is not nice, or good enough for any one, but it cannot be said that carding cotton can be done too nice, or that all carding on the revolving flat card is good enough.

Double carding on either the 30 inch or the 36 inch cards, or double carding on the revolving flat cards, comes nearer to being combed cotton, than we sometimes think, and the more care taken in doing this, brings to us a nice smooth yarn. In double carding on the 30 or 36 inch cards, of course the laps for the first or breaker carding should be equal to any made for any other cards, and if even, and well picked, the better for any card. But using 40 of these 30 inch cards for the first carding, running into one, and these laps put into the finishers with ten cards to a railway head, carding no more than 250 pounds per week, per

card, and with the cards ground and set as herein advised, nothing can equal it for carding.

On a 30 inch card, the tops will not deflect, so as to prevent very close settings, and therefore nothing will pass through the card that ought not. My method of setting tops, was to set the top nearest the doffer, just as close as possible, and not hit, and the next ten tops just the same, then graduate the rest of them, so that the top next to the feed roll, would be twice the distance from the cylinder, as the top next to the doffer, and with the tops so pitched, that the whole surface of the tops would fill even, and full. Double carding with this system cannot be excelled, except by double carding with the revolving flat cards. Some good spinners do this instead of combing the cotton, but it has its faults as to quality when put up against combed cotton.

Double carding with the common card, of course, the railway head is used, as usual, and upon the care, and proper attention to its workings, depends even work. Some of my critics on the reailway head may see no good in my method of running the railway head as in use years ago, but as there are many still in use, along with the improved railway head, I will suggest to all critics, if they have not already discovered the best way to care for these machines, to follow closely what I may have to say.

On both machines, the trumpet is the heart of the machine, and does the main business of causing the sliver to even, or not to even, according to its proper care. These trumpets are made from cast iron, and are affected by heat or cold. I used to attend to this before starting these machines in the morning and put the weight out on the lever, as far as experience told me to. It might be an inch, and it might be three inches, according to the condition of the room. Cold contracts iron, and the trumpet hole would be smaller in the morning, (a cold morning), and this would cause the sliver to be light in weight, until the room and trumpet got warmed up, by friction or otherwise, and I have known it to take two hours to get this back to its normal condition, and if nothing is done to prevent, it will make light work all this time and consequently uneven work. I used to move the weight out before the starting of the heads, then size soon after to see how the sliver was, and keep close after it until the room and machines had resumed their normal conditions, as was left the night before.

It is well known that in stopping cards at night, noon, or any other time, if the doffer is stopped first and then the cylinder, that the doffer will load up at the point in contact with the cylinder, and when started again, this load on the doffer will come through and pass along in the form of a heavy place, unless it be taken out, (and how many overseers are there who make the help take this out). If there be ten cards in a line, running into a railway head, there will be ten of these long bunches the length of the doffer, running through, and the trumpet is on the jump until they have all passed, or it breaks down, the head is stopped again and the same process is repeated. Now do not all say at once, this does not happen in my room, because any old carder knows, and all carders should know, that it does occur. My method of preventing in part, not in all, was to throw off the belts from the cards first, and stop the railway heads last, or as soon as the comb would not comb the sliver from the first card stopped.

On the revolving flat card, do not stop the doffer until you have thrown off the belt from the cylinder, and you will lessen the evil, if you do not stop it entirely. Now be particular about this, see it is done right, and good results will follow, in the form of more even work, all along the line. On the revolving flat card, the comb runs so fast that the main drive, or cylinder belt can be thrown off for some time before the comb will not comb from the doffer. Some may look at this as of no accaunt, or find fault by saying, the cotton passing through the card while slowing down, would not get the necessary carding and the sliver would not look clean. For those I would say, try it and see. Would it not be better to have a little carding, not so clean as it ought to be, rather than have the work uneven and full of heavy places? To those who have never thought of this, or if they have, and never put it in force, I would most earnestly advise doing so at once. You may think this of little account, and so small you do not want to bother with it, but if you wish to make the best carder in the harness, do not neglect this or any other little matter that you know quite well will produce a little better work.

I was in a new mill but a few days ago, and the superintendent told me he was not making any money and that it was hard work to sell the product which was yarns. That old customers did return for repeat orders, and he could not understand the reason. I could see the reason immediately. I was never in a mill, old or new, that was so dirty. The cards were loaded with dirt, and the help were using brooms to dust off the cards, so that much of the dirt fell into the sliver passing from doffer. Why the overseer could not see this passed my comprehension. Perhaps my readers will say, they don't see why any man would allow such carelessness. First, my brothers, look at your own help, and see if they are not doing this, or something just as bad, as we all know there are many, very many, places in the carding and combing departments where this or something just as wicked is being practiced.

Of all the mills where good, clean even work is demanded, it is in the yarn mills. As the product from these mills is used by others, and as they can and do buy yarns from different spinners, they know which runs the best with them, and if the price is satisfactory, they will buy where they can get that product which gives the best results. We will find the mill that has the best reputation and sells its yarns all the time, and is never slack for business, is the mill that looks sharp after these little matters, such as I have mentioned, and never lets up on it. It matters not how well trained you have your help, they will drop from the standard unless looked after every day and every hour. That is what an overseer and second hand are for. If once telling a hand would give the results and keep it so, the superintendent could do this, and do away with overseers and second hand, and hire a girl to keep the time and the books. But no, the best of help will drop back, unless looked after. Even good overseers will get a little slack, unless the man above them is onto his job. And the man above them gets his part of the prodding from his customers who find fault with his product. Therefore, my friends, let us all try to have things so that no one can come onto our jobs and find any worms under the stones.

The glucose and starch industry is the subject of a bulletin just issued by the Census Bureau at Washington. It shows that threre were 675,938,000 pounds of starch of all kinds, valued at $17,360,000, manufactured in the United States in 1909.

ONE OR TWO PROCESSES OF DRAWING.

BY B. M. P.

In the October issue of COTTON, "F. W. G." had an article in which he advocated one process of drawing instead of two processes. There were one or two statements, in this article, that I want to criticize in a friendly spirit.

In referring to the test that he conducted on 24's and 26's yarns, "F. W. G." says: "We were running two processes of drawing and turning the front roll 510 R. P. M. This was too fast, but could not be helped owing to conditions which demanded a certain production. Without conferring with the superintendent, I changed a breaker drawing over to a finisher, and slowed down the front roll speed to 300 R. P. M. I gained on production 90 R. P. M. by the change and the work produced was better in every respect." Later in the same article he says: "Cut out one process and save the individual fibers. The sliver will have a firmer and stronger appearance from one process of drawing and will make less fly."

Now, without doubting the correctness of the results obtained, nor necessarily contending that one process of drawing may not, under favorable conditions, give good results on coarse yarns, I want to point out the fact that the comparison made by "F. W. G." was not one that could be depended upon as a fair sample of what might be expected in all cases where a change from two processes of drawing to one is made. As quoted above, the double drawing had a front roll speed of 510 R. P. M. on both processes. This is too high. We know that, and we also know that sliver made under such conditions will, in most cases, be uneven and weak and the yarn will show up bad. One set of drawing is changed over to run at 300 R. P. M., or a reduction of 210 R. P. M. and the sliver and yarn, compared with that which had been drawn twice. The above could not be looked upon as a fair test between the merits of one or two drawings, as a comparison between the two must have all other conditions the same to be accurate. It was a test between two processes of drawing at an excessively high speed and one process at a low speed. The results noted were due to two things; the slower front roll speed and the cutting out of one drawing. The chances are that the benefits noted were due more to the fact of the great reduction in the speed of the machine than to the cutting out of one drawing.

The test, to obtain any accurate idea of the relative merits of single or double drawing, should have been conducted at the same speeds in both cases and then any differences noted would have been due solely to the cutting out of one drawing and not, as it now stands, to the cutting down of the front roll speed over 40 per cent and also the throwing out of one drawing. If "F. W. G." had kept the front roll speed at 510 R. P. M. on his single drawing, the results, whatever they would have been, would have been due only to the fact that it was drawn but once.

There is no doubt in my mind, for I have tried this, that if both processes of drawing had been retained but the speed of both reduced to 300 or 350 R. P. M. that "F. W. G." would have made a better sliver and roving and the yarn would have showed up evener and stronger.

I thoroughly agree with the remarks about over-drawing and excessive speeds, as both will do much towards weakening the final yarn. Also what was said in regard to the carefulness necessary in running one drawing instead of two, for it stands to reason that, with one chance less for overcoming irregularities in weight, we must have other conditons as near perfect as possible.

The chances for making singles or doubles, while the tender is piecing up, is lessened with one drawing and also was considerably lessened when the speed of the frame was cut almost in half, for the faster the frame is running the more chance there is for the broken end to feed into the machine before a new one is put up. This last refers only to making singles, of course.

THE RELATION OF THE MILL TO THE VILLAGE.

BY C. L. H.

First, let us define those two terms: the mill and the village. We understand the term "the mill" as applying to the corporation that owns the property in general and to those that have immediate control of it, in particular. By the term "the village" we construe as embracing the people who live in the village and all the problems incidental to or growing out of mill life.

If these definitions are correct, it is perfectly plain to every one that is at all familiar with mill business and mill life, that the relation of the mill to the village is a close, strong, vital and inseparable relation. The question naturally arises what are the obligations growing out of this vital relation. To answer this question, we must ask another. What are the most essential needs of the village? Since we have decided that the term "village" applies to the people who live at the mill, the question resolves itself into what are the needs of the mill people? I would answer first by saying, that they are human beings. We mean by that, that they have a threefold nature, viz, physical, mental and spiritual. The very fact that these people possess a body, mind and a soul, naturally necessitates a threefold attention. I believe that the obligations of the mill to the village are comprehended in these three needs. Let us notice them separately. First, the mill should furnish every reasonable available facility that will tend toward the best physical development and health. Such things as sanitary surroundings while at work, well built and sanitary houses to live in. Pure water for every use. Instruction by precept and example in the value and necessity of rigid sanitary conditions in and around the home. As far as practicable, proper places for recreative enjoyment, such as parks, gymnasiums, etc., under good safe management and directed along sound, safe and sensible lines.

Many mills are now spending thousands of dollars along these lines. The mill here is just putting the finishing touches on one of the most beautiful parks in the country, which has added greatly to the exercise and enjoyment of the people of the village in general and the young people in particular. So much for the physical necessities.

Now as to the mental needs of the village, they are so plain that he who runs may read. The mill should never stop until its educational facilities are thoroughly commensurate with the needs and opportunities of the village. This may call for a considerable outlay of money, but there is no other investment that will yield the mill a larger dividend. There are numerous plans that have been

proposed to induce the mill people to improve themselves by the aid of all the educational advantages around them. But the two that are productive of the best results are just to get an efficient and sympathetic corps of teachers, and then to firmly insist on the children of school age getting off the streets and into the school.

Also night schools for those employed in the mill during the day have been run in many places with splendid success. And on the whole the mills, or many of them, are to be highly commended for the splendid way in which they have provided for the mental needs of their villages.

As to the spiritual needs of the village, if the village is to be inhabitable it needs strong, well developed, well rounded symmetrical bodies, and minds of like proportions. But we can never realize the grandest and richest fruition of either, unless their powers and faculties are marshaled, lined and led by the spirit of God. This may sound a little strong at first, but it is a fact for all that. It is a fact for the simple reason that back of our creation was the divine intention that our bodies and minds were to be animated and controled by the Holy Spirit. This being the case, the mill is under sacred obligations to assist in and encourage the equiping of the village with the best possible religious facilities and by creating and maintaining as high a moral standard as possible, thereby permeating the village with a moral atmosphere that is conducive to the development of christian characters. The people of the village should be surrounded at all times both in and out of the mill, as far as possible, with those influences and with that treatment that makes for the development of human and social fellow feeling. It is this kind of treatment that results in more effective and permanent good for both mill and village. For this reason no man in authority whether he be section man, second hand, overseer, superintendent or president should be allowed to curse, tyranize, or abuse those under his authority. This does not mean that there is to be a slack system, for a slack system is injurious to all parties concerned. This does not mean that the man in authority shall not call for the exercise of every ounce of energy, both physical and mechanical that is under his control, for there is nothing unreasonable or wrong in that. Furthermore, this does not mean that the man in authority shall not criticize people for their neglect of duty for he will have that to do. But it does mean simply that all this shall be done in a more humane way. And the man who cannot do the skinning and correcting that comes along his line without sawing up the earth and cursing and abusing the wrong one, needs an enlargement either of his vocabulary, or the fungus growth with which he does his thinking.

This is said, be it understood, without any personal reference to any one that we know. It is not leveled at any particular person, but at a class of people that are sometimes met in all walks of life. I am glad that we are coming to see things more intelligently as the days go by, and that we are beginning to realize that our interests are mutual and inseparable. I trust that the day is not far distant, when we will have an intelligent conception of our relations and obligations to each other, and will be going forth like honest men and women really trying to discharge our duties to each other to the very best of our ability.

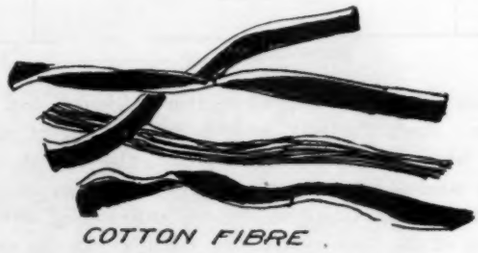
THE FIBER.

BY GEORGE RICE.

The first essential in manufacture of cotton goods pertains to the nature of the fiber employed in the textural construction. A view of the growing cotton plant is given in the first annexed illustration. The cotton procured therefrom is soft, downy and strong. There are, of course, numerous varieties. It is a good plan to have an assortment of sample sizes. In order to maintain a library of cotton or other textile fiber, some men establish a regularly collection of specimens, arranged in sample form, with little tufts of the different sizes and kinds combined for comparison. These tufts of fiber are all listed. There are specimens of fiber possessing extraordinary twist. There are other kinds noted for the length, curl or other feature and so on through the assortment.

The Sea Island or long staple cotton is separated from the Egyptian of like growth. The cotton from the low islands and sea coast of Georgia, Florida and South Carolina is noted the world over. It is the most valuable cotton in the world for general weaving purposes. The fiber is silky, soft, fine and strong. It has the necessary elements for making staple goods. If you place some of the cotton fibers under the microscope you will detect various physical construction features. You will find that

COTTON PLANT



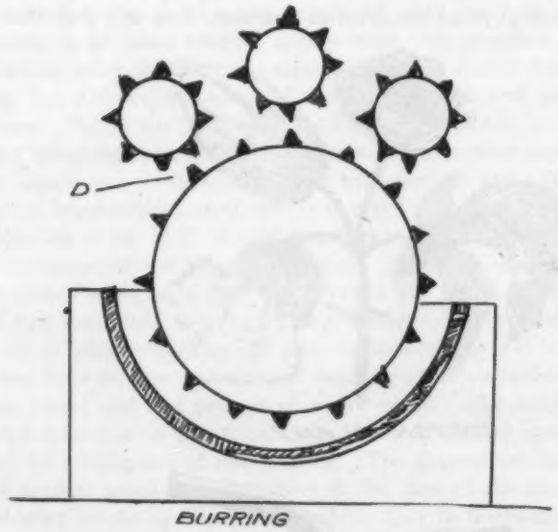
COTTON FIBRE

COTTON MIXES

the healthy fiber consists of a spiral band with more or less twist, as shown in the samples in second drawing. Irregular markings will show on the surfaces and thick borders exist.

But this cotton fiber entwines into fine threads of great usefulness in the textile manufacturing business. Whether ripe or unripe, the enlarging glass portrays the features of the fiber. Hence, in some mills, a regular inspection and test is made of every batch of cotton to ascertain if the fiber is properly cured. If the fiber is found to be immature and not ripe enough for practical working, the fiber is thrown out for general manufacturing purposes and is used in other combinations in goods in which a percentage of unripe stock can do little or no damage. The mixing department of the mill is, of course, very important for this and other reasons. I have seen defective cotton fiber worked up in such way that perfect goods have resulted in every particular. The mixes are presented in three shades in the next views, shqwn in shaded diamond forms.

The science of mixing fibers for effective batches has long since become a study. There are men in the best cotton mills who devote their time and energies to getting the best results with mixing vari-graded cotton fibers in large lots. The practice is to put in a layer of cotton of



BURRING

a certain lot. Then follows another thickness, and then another. Each thickness is of a different lot of cotton. Hence when the batch is completed, the top thickness usually reaches near the ceiling. Now the stock is fed to the picking and mixing machinery, and a most thorough combing of the fiber results very speedily. In the various colored mixes, the lots are graded from the letter A, B, and C and onward, to classify. An "A" lot would be almost white, while a "D" lot would be quite dark, and so on, as far as the lettering extends.

We next exhibit the principle of one of the burring devices, showing the point D where the stock is fed. In running the machine, care is taken to avoid tearing the fiber. I have seen good fiber torn and split due to non-effective burring. Sometimes an improper adjustment of the cylinders will cause considerable injury to the delicate fiber. With proper setting, the cotton fiber can be passed through the machine without serious injury to the cell walls of the physical structure of the same. It is a good plan to retain samples of woven stock so as to make comparisons at the mixing and picking. I used to have a cutter made of a square piece of metal, with cutting edges. The cutter is made to chop out pieces of samples about two inches square. There is a stem to the cutter block and a piece of wood can be put into the hollow so as to soften the blows which you will deliver in cutting the cloth. I employed a common pin file for holding the samples thus cut. This gives one a reference selection of samples and is handy to have.

THE INSPECTION OF CLOTH.

BY S. I. D.

A cloth inspector must be a man who is not afraid of hurting the feelings of any one, for it is his duty to lay out bad cloth no matter by whom it is made. He must also be a man whose judgment is excellent for he must be capable of deciding which cloth is first class and which is second, so that he may not make the mistake of putting the first class cloth out as seconds for fear he may make let something pass which really should not.

When he is inspecting on a folder he should be careful to fold the cloth smooth and straight as that has a great deal to do with the cloth's passing the second inspection of the buyer. Also, when inspecting cloth for immediate sale the inspector should always give the buyer what the contract calls for and at the same time he must try to be equally just to the mill, avoiding extremes in both cases.

An inspector should go through a cut of cloth, turning down a corner at a bad place in order that the overseer may see these places for in this way the inspector may be sure that nothing will pass which ought not to.

I have seen overseers of weaving go to the inspector and ask him not to lay out every little bad place, as the superintendent was already complaining to him of his bad cloth and that there had been a lot of bad warps from which he could not possibly make good cloth. But that is a question for the overseer of weaving and the superintendent to settle between themselves, and not a case for the inspector who should impress on the weaver that he was going to do his duty and lay out all seconds which came under his inspection.

It is announced that the Naigai Wata Kabushiki Kaisha (Home & Foreign Cotton Co., Ltd.), a cotton-spinning and weaving company with two mills in Japan, has recently completed a large cotton-spinning mill in Shanghai at a cost, including equipment, of some $500,000. The mill contains 20,000 spindles to spin cotton yarns between 10s and 20s count from India and Chinese cotton. The operatives will be Chinese under Japanese superintendence. Spinning operations begun the end of July.

The Hawaiian Cotton Growers' Association plans to send an entomologist to India to search for a parasite for the boll worm, which is threatening the island's cotton crop. The crop promises well if it does not suffer a setback from the pest.

Large tracts of land have been purchased in the region of Haifa and Akka in Palestine by George Eid for cotton growing. The tenants are to be supplied with seed and all modern agricultural implements.

NEW MACHINERY AND TRADE NOTES.

A RECORD SHIPMENT OF NORTHROP LOOMS.

Cotton Chats for October has been sent out by the DRAPER Co., of Hopedale, Mass., in which they describe their record shipment of Northrop Looms. This was made September 30th, when they shipped 265 looms in one train.

These looms were distributed among the states of Indiana, Massachusetts, Maine, New Hampshire and South Carolina, and nearly all replace common looms.

In these days of adverse mill conditions, manufacturers are realizing that they cannot afford to operate looms which do not represent the greatest efficiency, and which do not enable the operative to return the largest product per unit of labor.

Northrop looms are in successful operation on nearly all cotton goods that can be woven with one shuttle. The best evidence of the relative value of Northrop looms is the fact that they are rapidly replacing common looms, many of which are in practically as good condition as when new.

That a very large share of their shipments are to mills replacing old looms is proven by the illustration which they show on the fourth page of *Cotton Chats,* where is seen a partial view of a mountain of scrap iron composed of about 20,000 old looms, and which occupies a large portion of their foundry yard. For the past two years their loom shipments have been so largely in exchange for old looms, that it has been impossible to melt the old looms as rapidly as they have been received. To obtain the best results at the foundry, they can only use a certain percentage of old iron, and although the scrap represented by old looms is of the best quality on the market, they are obliged to carry a large proportion of pig iron in the mixture.

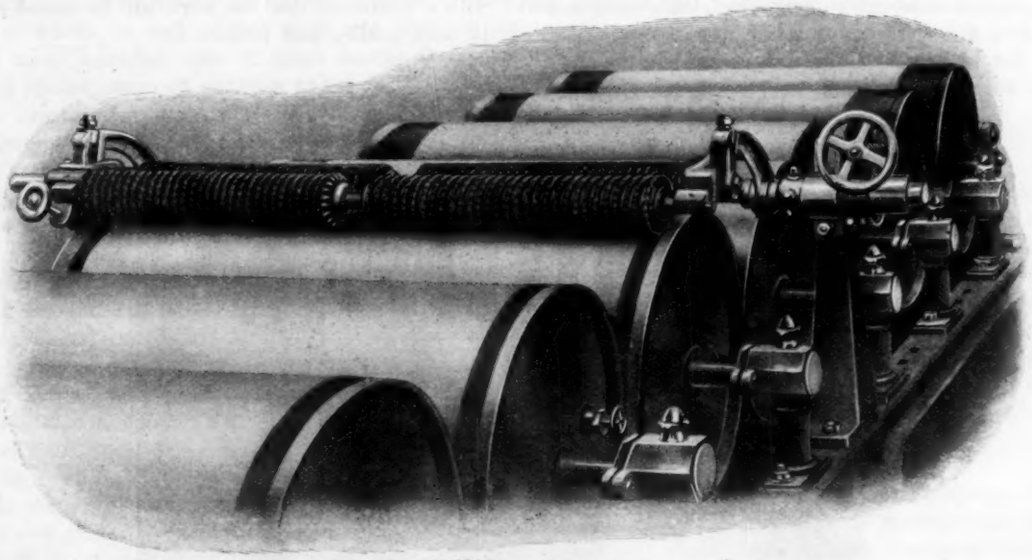
Notwithstanding the general curtailment among cotton mills the present season, and the fact that few have been operated at a profit, they have received orders for enough Northrop looms to absorb a large share of their output during the coming winter.

Among recent contracts received by the Power Specialty Company, 111 Broadway, New York, for Foster superheaters are the following: New York, New Haven & Hartford R. R. at their Cos Cob and Bridgeport plants, 10,620 H. P. in Bigelow-Hornsby and B. & W. boilers; Delaware, Lackawanna & Western R. R. at their Loomis Colliery, 900 H. P. in Erie City boilers; International Harvester Co. at their Plano and Weber plants, 2,800 H. P. in Edge Moor boilers; Associated Pipe Lines, 3,000 H. P. in Edge Moor boilers; Haskell-Barker Car Co., 3,200 H. P. in McNaull and B. & W. boilers; J. R. Nutt Plant, Fort Worth, Tex., 4,000 H. P. in Edge Moor boilers; Clark Thread Co., 1,000 H. P. in Stirling boilers; Indiana & Michigan Electric Co., 3,200 H. P. in Wicks boilers; Wilmington & Philadelphia Traction Co., 3,000 H. P. in Edge Moor boilers; Penn Central Light & Power Co., 2,400 H. P. in Edge Moor boilers; and Citizens Light, Heat & Power Co., Montgomery, Ala., 3,200 H. P. in Stirling boilers.

A FINISHING PLANT APPLIANCE.

The Bristle Cloth Stretcher, illustration of which is shown herewith, is continually gaining in popular favor as a means of expanding goods to the required width. By being able to install this machine at a point on the drying cylinders, where the moisture has practically evaporated from the goods and they are beginning to set, the width gained by the steady push of the bristles from centre to selvage, is retained and in many cases has made belt stretching or tentering unnecessary, thus saving both time and expense.

This stretcher is being used with great success by print works to remove wrinkles in light goods before passing under the printing rolls. Also, in calendering goods of similar weight for the same purpose, where creases are so apt to run on each side of a sewing. This machine is manufactured by the American Finishing Machinery Co., of 141 Milk St., Boston, Mass.



BRISTLE CLOTH STRETCHER ON A SET OF DRYING CYLINDERS.

CONSTANT ADVERTISING MAKES SUCCESS ASSURED.

It is a well known fact that to-day nearly every line of business feels the effect of the keen competition that has appeared because of a slackening in the general demand for manufactured products, and the result is that of the total number of firms doing business, only a few survived who were able to meet and overcome the difficulties that did spring up.

A good example of a firm that has been able to compete and win over a lot of business is the case of the DARY RING TRAVELER CO., whose office and factory is located on Weir Avenue, Taunton, Mass.

The plant occupied by this concern is a large two-story frame building, with a total floor space amounting to about 2,400 square feet. On the first floor are located the various machines, including rolls, cutters and turners and sveral automatic appliances for preparing the wire for the products into which it is finally to be made. In the rear part of the building is the tempering room for getting the steel at the right temper and the whole of the upper story is used as a storage, shipping and general assembling department.

The raw materials used are of the best and comprise the finest grade of Swedish coil stock. This is rolled for different sizes and shapes and is case hardened, after which it is converted into steel which must have a fine spring temper. From this the travelers are made in shape as may be called for.

This business was started on Myrtle street 12 years ago, employing three men. Four years ago, increased business prompted a removal to its present quarters where they are doing more than twice the business they did in the old quarters. To-day this company is supplying the largest mills in the country. Only the finest materials—imported stock—is used in the manufacturing of these goods, and the skilled labor employed, who have proper knowledge of the tempering processes make the travelers of even temper and long life.

The president, agent and treasurer of the company is Marcus A. Dary and the superintendent is Fred H. Dary. Both mentioned thoroughly understand this business and have made a big success of it.

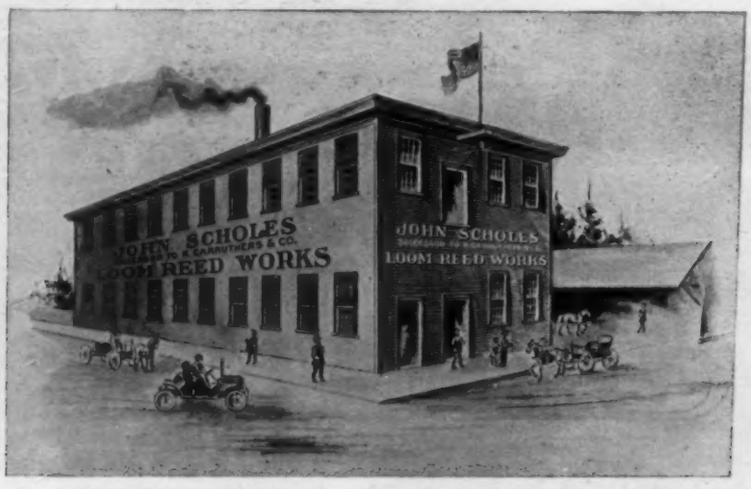
A recent color chart received from the BERLIN ANILINE WORKS, 213 Water Street, New York, describes their sulphur black AWL, Extra. This sulphur black dye is especially applicable to cotton fabrics and is numbered 1774 on their price list.

The CROCKER-WHEELER CO., of Ampere, N. J., are sending out a little book they have just published on induction motors. This little booklet will be of especial interest to the trade, inasmuch as it explains some features of these motors which have not heretofore been clearly understood by motor users. It describes particularly the use of the Crocker-Wheeler Company's patented magnetic bridges and they have taken particular pains to make it clear in this booklet just how these bridges add to the motors' operative characteristics and mechanical durability and convenience. A copy will be sent on application to the publishers.

The next time you get ready to apply a coat of white wash to the walls and ceilings of your factory, mill, shop, shed or warehouse—don't. Use instead Lythite Cold Water Paint. This paint is made ready for instant use by the addition of cold water and the surface on which it is applied may be recoated many times without a tendency to scale. It does not require experienced help to apply it and it keeps in good working order for several days after being once thoroughly mixed. The A. WILHELM CO., of Reading, Pa., are the manufacturers of this paint and a sample card showing its appearance when applied will be furnished on application.

A SUCCESSFUL MANUFACTURER.

One of the most successful manufacturers of loom reeds for the silk, cotton and worsted fabrics is John Scholes, whose factory, at Hale street, Lowell, Mass., is shown herewith. Mr. Scholes who has thirty years' experience in every branch of the business in this country and abroad, purchased the old established concern of R. Carruthers & Co. one year ago and is now celebrating the anniversary of that event. No order is too small or too large to handle not only with promptness and dispatch but with a guarantee that the work will be found satisfactory in both quality and price.



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COTTON MACHINERY

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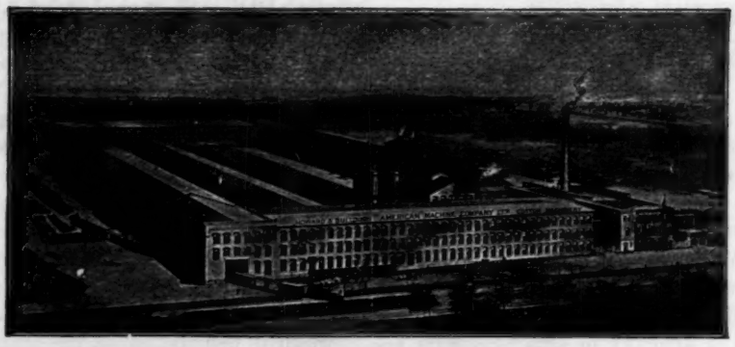

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WE INVITE YOUR INVESTIGATION AND COMPARISON

THE YARN PRODUCT OF SOUTHERN MILLS.

The development of cotton manufacturing in the cotton producing states has not only made such rapid advances as to require a larger supply of raw stock than is used in the rest of the country, but the quality of the product is such as to satisfactorily meet every demand.

This statement applies with particular force to the yarns made to be manufactured further into thread or into the innumerable variety of fabrics, whether braided, knitted or woven, as well as that made into lace. While perhaps many manufacturers of yarns confine their product to a limited range of qualities and sizes, the Cannon Mills, an organization of which J. W. Cannon of Concord, North Carolina, is the head, make all numbers and grades of yarn from No. 2 to No. 110, and undertake to supply any demand in any quality, whether from upland long staple or Egyptian stock.

This corporation has offices at 55 Worth street, New York, and are represented in New England by O. S. HAWES & BRO. of Fall River, Mass., who may fairly claim to be the longest established firm of yarn dealers in the country. The grandfather of the members of this house, Oliver S. Hawes, Senior, being a manufacturer of cotton warps in 1843, and operating 600 spindles on Water street of that city.

The Ingersoll-Rand Company, New York City, has ordered the folowing apparatus from the General Electric Company: 4 synchronous motors, aggregating a capacity of 1,400 H. P.; 4 exciters; 4 synchronous motor panels, 1 blank panel.

For use in bleacheries and print works, Rosin Soap, for use in starching fabric, Rosin Size give very satisfactory results. These superior articles are made by THE ARABOL MFG. CO., New York City, are perefctly uniform, free from impurities and thoroughly filtered. Whoever uses them is pleased and finds them very economical.

A recent announcement made by the SOUTHERN SPINDLE & FLYER CO., INC., of Charlotte, N. C., is to the effect that W. H. Hutchins, the former secretary of the corporaton has been elected vice-president, and Harrie L. Fales will be secretary. Mr. Fales received his practical experience in the North and is well known among the mill men of the Southern states. W. H. Monty still retains his position as president and treasurer.

The ALLIS-CHALMERS CO., of Milwaukee, Wis., are sending out their bulletin No. 1075, describing belted alternating current generators. This bulletin contains information as to the conditions under which these generators can be best used, together with detailed descriptions and illustrations of the various parts of the machine. A table of standard ratings is also included. A copy of this bulletin may be procured by sending a written request to the home office of the company, or to any of its branch offices.

The Carnegie Steel Company, Pittsburg, Pa., has ordered a large synchronous motor generator set and a switchboard from the General Electric Company for the Schoen Steel Works, McKees Rocks, Pa.

SOMETHING ABOUT SOAPS.

Every finishing plant, every knitting mill, and every laundry in the country are thoroughly alive to the benefits to be derived from the use of a high quality of soap products. That rich, soft full feeling of knit goods can only be acquired by the use of soaps in washing designed for that particular purpose. Laundries have their own difficulties to encounter and they need a soap designed for their own special use. In the finishing plant whether the goods are dyed or bleached, whether the finish is soft or hard, soap plays an important part.

The manufacture of soap and soap powders, is in all respects the same as any other line of manufactured products, viz. in order to reach perfection many years of patient experimenting and careful compounding are necessary. Bearing the above fact in mind, it is always well when ordering soaps, whether for textile or laundry uses, whether in the form of bars, chipped, or powdered, to remember that the AMERICAN SOAP AND WASHOLINE COMPANY, of Cohoes, N. Y., have been established since 1861 and have had fifty years of practical experience in the preparation of their high-class soap products.

When you are having difficulty in satisfying your customers with the finish on their goods, remember that perhaps this trouble may lie in the grade of soap you are using and consult with some reliable soap manufacturer like the above company, who has had fifty years of practical experience along this special line. Just write them a letter and tell them your troubles and they will be glad to make a recommendation which will doubtless prove of material assistance in solving your difficulty. All prominent supply houses handle the products manufactured by this company and may be procured from them at factory prices.

PERSONAL.

William Scott Taggart, member of the German Society of Mechanical Engineers and the Textile Institute, and a frequent contributor to the columns of COTTON, has opened offices at 22 Bridge street, Manchester, England, as a consulting engineer in general-engineering and textile work.

The success of Stehli & Co., silk manufacturers, in the manufacture of silk at High Point, N. C., on the Southern Railway, has been such that they will immediately enlarge their plant, and have arranged to erect a building of modern weave shed construction, size 124 x 144 feet. They will install and put in operation in this addition, one hundred looms and give employment to one hundred and twenty-five additional hands, making a total employes' roll of about three hundred and fifty people.

A business organization in the United States, cooperating with the Bureau of Manufactures in extending the sale of American goods in an Asiatic country, states that a group of firms in the country in question is interested in forming connections with manufacturers in the United States, and desires now to purchase cotton gins. Catalogues, price lists, and full particulars should be sent to these concerns as soon as possible. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file No. 7391.

THE BARBER WARP TYING MACHINE.

Now and then someone is found who supposes that the Barber warp tying machine could be used only on repeat work; that is, it could reproduce any pattern, which had already been drawn, by tying new ends to the last ends of the previous warp, but that if the number of ends or the width of the cloth were to be changed, the machine could not be used, and that the new style would necessarily have to be redrawn.

The other day the writer was in the dresser room of a print cloth mill having about 3,500 looms and two warp tying machines, and was interested to find that they were not only changing the number of ends per warp, but the width as well, and were making the change with the warp tying machines.

The cloth which they had been weaving was 28 inches wide, 1,784 ends, but the new cloth was to have only 1,492 ends, 27 inches wide. The overseer explained the method as follows: a lease of the old style was taken and eight ends, four from each shaft, were broken out at equal intervals until the required number were left. The lease was then sent to a drawing-in hand to be "re-reeded", after which it was tied in on the machine, giving the new draw required. This mill formerly had thirty drawing-in hands under ordinary conditions. The warp tying machines replaced all but two of these, as the only work left to be done the old way was "smashes" and new harnesses. When I called they had four extra girls "re-reeding" and the overseer told me that one girl could "re-reed" twenty-eight warps in nine hours, but if she had had to draw the harness as well as the reed, eight or nine would have been a good days work.

This machine is manufactured by the BARBER-COLMAN Co., of Rockford, Ill.

MILL NEWS.

Notices of mill projects, additions or improvements are solicited for this department.

ALABAMA.

ANNISTON. The United Hosiery Mills of this place is going into the manufacture of silk hosiery and have already ordered the necessary machinery for this purpose. This concern is one of the new plants of the year and was formed with a capitalization of $100,000 by S. C. Mead who came South from Philadelphia.

CONNECTICUT.

WINCHESTER. The New England Knitting Co., of this place has doubled its capital stock, which now amounts to $200,000.

FLORIDA.

TAMPA. It is reported that at the next meeting of the Board of Governors of the Board of Trade of Tampa, a proposition will be discussed which has been made by one of the leading textile companies of Pennsylvania, which is seeking to establish a mill in Tampa.

GEORGIA.

TOCCOA. The Capps Cotton Mill is contemplating the construction of another dam on the Upper Toccoa Creek for the purpose of installing electrical drive at its plant. Motors have already been purchased and it is announced that the plant will soon be in operation.

FORSYTH. It is reported that the Star Cotton Mills of Forsyth will be incorporated with a capital stock of $30,000 to take over and operate the Newton-Harp Mfg. Co's plant. This plant contains 3,360 ring and 846 twister spindles, for the manufacturing of course cotton yarns and ball twine.

ATLANTA. It is reported locally that W. C. Martin, the new secretary of the Martel Mills, at East Point, recently

Barrett Specification Roofs

View of business district, Kansas City, from Baltimore Hotel

EVERY roof in the above view of the Kansas City business section, with the exception marked X, is a Barrett Specification type of roof.

Such a preponderance is not unusual.

A birds-eye view of ***any*** American city, Chicago or New York for instance, will show enormous roof areas laid along the lines of The Barrett Specification, testifying to the almost universal approval which such roofs have won.

Barrett Specification Roofs are greatest in durability and their net cost per foot per year of service, is far below that of any other roof known. In other words, Barrett Specification Roofs give more protection per dollar of expenditure than any other kind.

Copy of the Barrett Specification ready for incorporation into building specifications free on request.

Special Notice

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired however the following is suggested.

ROOFING—Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified, and subject to the inspection requirements.

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TRADE B MARK

made an inspection of the cotton mill at Dublin, Georgia, which is shortly to be sold. It is possible that the New York associates of Secretary Martin will bid on this plant when it is sold on the strength of his report.

LAGRANGE. With a full corps of operatives and plenty of work in sight, the LaGrange Cotton Mills have begun operations after a shut down of nearly a year. This mill which is the property of the Consolidated Duck Co., of Baltimore, Md., is now expected to run for an unlimited period. M. E. Stevens is the superintendent.

ATLANTA. The Piedmont Cotton Mills of Egan, Ga., are operating on full time, producing wide duck, cotton towels, crochet quilts and jacquard specialties. This company is now erecting an additional building to provide space for new machinery and it will install about 20 broad looms for weaving bed spreads.

MARIETTA. The additional building which is being constructed for the Marietta Knitting Co., is nearly completed. This building is of modern design and construction and with 40,000 square feet of floor space. It will be equipped with machinery for manufacturing seamless half hose.

EAST POINT. The Martel Mfg. Co., has been incorporated with $200,000 capital stock and will occupy the old Elizabeth Cotton Mills recently purchased by E. Huggens of the Farish-Stafford Co., of New York. This plant will be overhauled and arrangements will be made to operate about 10,000 ring spindles and 25 looms.

INDIANA.

NEW CASTLE. Directors of the New Castle Industrial Co., recently met here with Richard Erwin of New York to discuss the proposition made by Mr. Erwin to locate a Knitting mill at this place for the manufacture of underwear. This company would be combined with another company located in Mohawk, New York and owned by Mr. Erwin and known as the Mohican Knitting Co., with a capital stock of $800,000.

ILLINOIS.

LINCOLN. The Commercial Club of Lincoln is planning to establish a knitting plant and endeavoring to raise $25,000 toward the new enterprise, among local capitalists.

MASSACHUSETTS.

NEWBURYPORT. The old Peabody Mill is being refitted and repaired and it is expected it will soon be ready for the installation of new machinery.

DOUGLAS. The Tallyho Knitting Co. is to be incorporated at this place in a short time for the manufacture of knitted goods. Ernest Wye of Needham, Mass., will be manager and is the chief promoter of the proposition. It is to be incorporated under the laws of Massachusetts with a capitalization of $20,000.

MISSISSIPPI.

JACKSON. It is locally reported around Jackson that a number of Fall River spinners are negotiating for the purchase of one of the best known plantations in the Delta through governor elect Brewer, who is representing the spinners. It is probably their intention to follow the example of the English spinners in acquiring tracts of land in the Delta and to grow their own long staple cotton.

MISSOURI.

ST. LOUIS. It is reported that Walter H. Carter, formerly of Memphis, is obtaining capital to open a large bleachery and finishing plant in North St. Louis. He has engaged the old Tebbetts factory at 2d and Branch streets for the bleachery and will procure much more spacious quarters for the finishing works.

NEW JERSEY.

CAMDEN. The Highland Worsted Mills of this place have installed knitting machines for the manufacture of a complete line of sweaters.

NEWTON. The Sussex Print Works was incorporated recently with a capital of $150,000, and will convert and finish silk and silk mixed goods.

CAMDEN. The Quaker Dye & Bleach Works of this place have been incorporated with a capital of $50,000. Joseph Graham, Arthur Sharp and F. G. Gwynn are the incorporators.

NORTH CAROLINA.

RALEIGH. It is locally reported that the Durham Hosiery Mills of Durham, N. C. are to purchase a small mill here in Raleigh and equip it for looping work.

HIGH POINT. The Spehil & Co., silk manufacturers at this place are to enlarge their plant and have arranged to erect a building of modern weave shed construction, 124 X 144 feet.

DURHAM. Reports are current that the Durham Hosiery Mills will build a mercerizing plant, at its Chapel Hill branch knitting establishment.

THOMASVILLE. The Amazon Cotton Mills are proceeding with their improvements which were announced recently. This will increase the companie's present equipment to nearly double, and means an additional investment of approximately $100,000.

PENNSYLVANIA.

PHILADELPHIA. The North American Lace Co., of Philadelphia is erecting a three story club house for the girl employees of its plant. This building will cost approximately $5,000 and it is expected to be finished by January 1st.

WEST SHORE. The new addition to the new Cumberland Knitting Mill has been completed and new machinery is being put in the building preparatory to starting up.

DANVILLE. It is reported that the Wyoming Valley Knitting Mills of Plymouth, Pa. intends to start a branch plant at this place for the manufacture of infants' fancy half hose.

SPRING CITY. The progressive Knitting Co. of Philadelphia is to open a factory in this town for the manufacture of fancy underwear. The Gudd building is being remodeled and prepared for this company's plant.

RHODE ISLAND.

PROVIDENCE. The Standard Textile Co. has been incorporated at this place and capitalized at $100,000 to manufacture finish, dye and bleach, cotton, silk, woolen, and linen yarns. J. T. McKee, J. E. Boland, and J. Frank Supderland are the incorporators.

PROVIDENCE. The Rhode Island Absorbent Cotton Co. has been granted a charter for the purpose of engageing in the manufacture of bleaching, dyeing, spinning, treating and dealing in absorbent cotton and its kindred products. This new concern has been incorporated and is capitalized at $100,000.

SOUTH CAROLINA.

ROCK HILL. It is currently reported in Rock Hill that an overall factory is to be established here by Hamilton Carhartt of Detroit and Rock Hill. The Alden-Carhartt Cotton Mills has been making denims for the Detroit Overall Factory and has been in operation here for three of four years. According to these current reports, a part of the machinery has already been shipped from the Detroit plant and will be established at this place.

GREERS. The Greers Mfg. Co. is making progress with the construction of its new building. This will be 100 by 130 feet and when completed will be equipped with about 14,000 spindles, 450 looms and accompanying machinery.

TENNESSEE.

CHATTANOOGA. The Buster Brown Hosiery Mills of this place are progressing rapidly in the construction of their additional building. This structure will be 65 feet wide by 225 feet long and will probably be ready for occupancy sometime in January.

NASHVILLE. The Ideal Mfg. Co. has been incorporated at Nashville with $10,000 capital stock for the purpose of manufacturing knit goods.

TEXAS.

HOUSTON. Announcement has been made that Miller Bros. will establish an overall factory here. Machinery is already purchased and is now on the way.

BRENHAM. The Lone Star Cotton Mills of Brenham have been formerly organized with D. C. Giddings as president, D. T. Williams, as secretary, H. F. Holmes, as manager. This company is the successor of the Brenham Cotton Mills and is now preparing to operate the plant.

AUSTIN. It is reported that S. A. Robinson, associated with a number of men from Lowell, Mass., in the projection of a cotton mill at San Benito. It is stated that work will soon be started upon the necessary buildings of the plant.

VIRGINIA.

RICHMOND. We reported in a recent issue the establishment of a silk ribbon factory at this place to employ approximately 250 people. For this purpose the Virginia Silk Co. has been organized and 48 looms will be installed. W. M. Depars of Hagerstown, Md. will be the general manager and superintend the business. $250,000 has been subscribed as the capital stock.

ELBA. It is locally reported that R. B. Powell is endeavoring to organize a knitting company capitalized at $40,000 to locate at this place.

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